TESTIMONIALS

FOR THE

CURE OF CHOLERA.

BY

JOHN REBEIRO,

ACCORDING TO

DR. J. M. HONIGBERGER'S

SYSTEM OF

TREATMENT.

Calcutta:
J. A. MONNIER, NATIONAL PRESS, 8, HASTINGS STREET
1864.

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INTRODUCTION.

In publishing these testimonials, the sole object I have in view is to place before the public a few facts as to the results of Dr. Honigberger's mode of treating Cholera by Quassia inoculation. I am aware that it must be long before the superior efficacy of this simple method of treatment over the varied and constantly changing methods adopted by the profession is generally admitted; and I am not so sanguine as to hope to be able to accomplish that which Dr. Honigberger himself failed to accomplish, namely, to secure to his theory of Quassia inoculation a place in the estimation of the public among the certainties in the noble, but still uncertain, Science of Medicine; but I am convinced that the facts now published being only a few out of a great many that have come under my observation, resting as they do on evidence entirely reliable, are of too emphatic a character to be explained away by any other hypothesis than one favorable to Dr. Honigberger's theory. It will be seen that almost all the cases mentioned were of a serious and not a few of even a desperate character, and that when placed under my treatment the ordinary modes of treatment adopted by professional men had been tried and had failed.

I make these observations in no spirit of vain glory, nor do I intend to insinuate that I possess any peculiar skill in the treatment of Cholera. On the contrary I firmly believe that whatever success has attended my efforts is under Providence entirely attributable to my having carefully followed the mode of treatment recommended by Dr. Honigberger.

I am no medical man myself, nor do I regularly practice the healing art. Observing the efficacy of Dr. Honigberger's medicine in one or two cases, particularly in the case of a child of my own, with the help of Dr. Honigberger I commenced this mode of treatment among my personal friends and relatives, till my success attracted the notice of a larger circle of acquaintances, and, eventually, of strangers, who began to seek my aid in this respect, and now my practice, conducted during leisure hours, (for I have other regular occupation to attend to,) has become to me a source of pleasure, and, to some extent (when rewarded) of gain too.

By reference it will be seen that Dr. Honigberger makes mention of me in the preface of his third pamphlet, published in 1861, pages XXIII and XXIV.

J. REBEIRO,

No. 3-1, Bapareetolla Lane,
N. W. Corner of Wellington Square.

From MOONSHEE EMAMOODDEEN *of Chandney Chowk, and* ABDOOL HAKEEM, MOONSHEE ABDOOL KUREEM, MOULVIE AULEEMOODEEN, *and* MOONSHEE HOSEINOODEEN, *as eye witnesses to the case, dated Calcutta, the 4th September* 1859.

CERTIFIED that Mr. John Rebeiro attended on the wife of my younger brother who had been attacked with severe Cholera, and continued till she was perfectly recovered. We doubt not of his being a skilful Cholera Doctor; that, during the very short time of his attendance, he evinced his great intelligence in curing such a mortal complaint.

From MR. C. N. MAYERS, *a Government Pensioner, dated 20th September* 1859.

SIR,—SOME months ago I had occasion to go to you to get one of my children inoculated with Quassia for Cholera, and I am happy to say the cure was almost instantaneous, inasmuch as he was quite well that very day. I have to return you my most sincere thanks for the same.

From SHAIK RYMOO *and* BEBUN, *his wife, servants in the employ of* MR. J. D. SWIFT, *Pleader, Court of Small Causes, Calcutta, dated 19th November* 1859.

SIR,—WE are happy and truly thankful to tell you, that your mode of treatment towards our daughter, when she was seriously labouring with the Cholera, had wonderful effect, and in a little time she found great relief, and now she is enjoying first rate health. We beg, Sir, that you will kindly accept our humble thanks. We feel that we cannot be sufficiently grateful for the benefit our daughter has derived from your valuable treatment.

From **Mr. H. Barridge,** *an Assistant in the General Post Office, dated 21st November* 1859.

Sir,—It is through the great mercy of Providence I am now enabled to hold my pen to return you my most sincere thanks for the skill and care with which you treated my Cholera case on the 10th instant. I am surprised the medicines and inoculation you used for such a fatal disorder were really simple, and gave me no pain, and yet it had its good effects, which will never be forgotten. I am quite well now.

From **Mr. M. Gomes,** *late of the Adjutant General's Office, a Government Pensioner, dated 9th December* 1859.

Sir,—I now return you my most grateful thanks for your exertion and kind attention paid in curing my poor Mary, when she was labouring with Cholera. I am really sorry indeed that I could not offer you any reward for the trouble and pains you have taken for my daughter, from the commencement of her illness until she perfectly recovered from danger, for which I shall offer my fervent prayers for your health, long life and prosperity. Mary is quite well now.

From **Mr. M. J. Rodrigues**, *an Assistant attached to the Office of the Inspector General of Jails, dated 29th January* 1860.

Sir,—With the greatest pleasure I beg to acknowledge the wonderful effects of the Quassia administered by you in the cases of Cholera, both in the cases I have seen and heard of; and also to say that the filial attention and kindness you take in the patients that fall under your care is really commendable and worthy the character of a Christian. If these few lines could in any way establish you in the confidence of the public, it will not be only a blessing to those who avail themselves of your medicine, but be an object of great joy.

A Persian Certificate, dated July 1860 *from* **Moonshee Rahatullah**, *attached to the Printing Department of the Bengal Secretariat Office. I attended on this patient by desire of T. Jones, Esq., Registrar, Bengal Secretariat.*

J. R.

From **Mr. Phillip Alcantra**, *dated Calcutta, the* 10*th July* 1860.

Sir,—Permit me to acknowledge with heartfelt gratitude the extraordinary cure effected by your treatment in the severe attack of Cholera I have just recovered from. I have the pleasure to state for your credit that all my relatives and friends who saw me suffering despaired of my life; the cure has really been a miracle effected by your medicine under the hands of Providence.

From Mrs. A. J. A. Simons, *dated* 10*th November* 1860.

This is to certify that Mr. J. Rebeiro has successfully treated my servant's child, an infant of the age of twelve months, who had all the symptoms of a violent attack of Cholera, commencing with violent purging and vomitting, and ending with cramps. To your treatment of inoculation with Quassia, and the unintermitted attention you bestowed upon the poor child, I ascribe, under Providence, his recovery. You have justly merited the prayers of the afflicted parents and the admiration of all your friends, and I trust that of the benevolent Public.

From Mr. P. Pereira, *attached to the Alipore Jail Press, dated* 16*th November* 1860.

Sir,—Accept my grateful acknowledgments for your kindness in so readily affording relief to my daughter, Mrs. J. A. Elloy, residing at Cossitollah, when she was attacked with Cholera. Your treatment of that disease with Quassia, and your very great attention, have been the means, under Providence, of restoring her health within a comparatively short spaec of time; and I pray that your success in all cases will be not only equally rewarded but justly appreciated.

From Mr. George D'Rozario, *of the East Indian Railway, dated* 28*th December* 1860.

Sir,—I have much pleasure in stating that my child, who was attacked with Cholera in May 1860, recovered under your kind treatment.

I have confidence in your way of treating Cholera, having witnessed the numerous cures when in company with you from time to time, and amongst them cases where other remedies failed, while you caused a change for the better and eventually cured the patient. I wish you every success. I remain ever grateful.

From MRS. A. GOMES, *and* MRS. A. E. OWEN, *Mangoe Lane, dated the* 8*th January* 1861.

THIS certificate is granted to Mr. John Rebeiro for effecting a very praiseworthy cure of a severe case of Cholera on our grandson, Sandy D'Cruz, aged 13 years, which took place on the 15th December last. We must not omit to state that when the case was given to Mr. Rebeiro for treatment, Cholera had advanced very far, and the boy was pulseless and cold, so much so that many of us despaired of his recovery. We feel further our duty, to do him credit that from his strict care, attendance, and medicines, he was soon restored to perfect health; and we can confidently recommend him to any person who may require him in Cholera cases. We have gladly made him a handsome present.

I gladly attach my signature, coinciding with my mother and aunt in granting this certificate to Mr. Rebeiro. Sandy is my only son, and may the Lord bless Mr. Rebeiro for restoring him to me.

(Sd.) M. D'CRUZ.

We, the undersigned, have witnessed this case of Cholera, and Mr. Rebeiro effecting the cure, and therefore gladly attach our respective signatures and join in granting this certificate to him.

(Sd.) A. E. D'CRUZ,
„ E. PEPPER,
„ M. ANDERSON,
„ G. ANDERSON.

From MR. W. BIRD, *Loll Bazar, dated* 11*th Jany.* 1861.

SIR,—MANY thanks for your kind attendance on my peon Kyam, whom you cured of Cholera, I shall never forget your so good and effective medicine for its cure; and I shall safely recommend you to all my friends and the public whoever I meet with, and speak highly of your medicine.

From MR. P. G. MICHAEL, *an Assistant in the Office of the Collector of Stamps, dated* 23*rd January* 1861.

THIS is to certify that Mr. J. Rebeiro attended on me on an attack of Cholera in 1859. His treatment is the same as Dr. Honigberger's, and it proved very beneficial to me.

From MR. M. A. MINOSS, *an Assistant of the Bengal Secretariat, dated* 25*th January* 1861.

SIR,—I HAVE great pleasure to state what I know concerning your Cholera treatment, both from my own knowledge and what I have heard from others, that you have succeeded in almost all cases where timely call was made for you. I have myself used the Quassia you made for me on two servants attacked with Cholera, and both have recovered.

From MR. C. S. ELLOY, *an Assistant, General Post Office, dated* 27*th January* 1861.

SIR,—ACCEPT my sincere thanks for your kindness in having attended on my baby during his illness. You were very reluctant to take him under your treatment in consequence of his having passed recovery; but my persuasion compelled you to undertake the hopeless case, and I only regret that I did not send for you when the child had the first symptoms of Cholera, as I have before heard of the numerous cases of cure while under your excellent treatment.

From T. H. Wood, Esq., *Chowringhee, dated 27th January* 1861.

Sir,—I have much pleasure in informing you that your remedy for curing Cholera is approved by me, and many people have spoken to me about it, and appear convinced that the remedy you apply is the best, and say that if ever they should be attacked with the disease, they would place themselves in your hands with every confidence.

From Mrs. C. Fitzpatrick, *dated Calcutta, the 28th January* 1861.

Sir,—Permit me to convey to you my utmost thanks for your kind and attentive care and medicine you gave me when I was suffering from Dysentery. I am surprised how I was cured in so few days, and before half the vial of your medicine was out. Other remedies I used for three months all failed.

From Mr. A. Monteiro, *of the Geological Museum, dated the 29th January* 1861.

Sir,—I am well satisfied with your experienced treatment on Dysentery.

My son, who suffered for 7 months, (treated with English medicines) is now quite well in a few days under your treatment, and enjoying the best of health. I shall strongly recommend you to my friends who may require such treatment.

From BABOO GOPAULKISSEN BOSE, *of the Bengal Secretariat Office, dated 29th January* 1861.

SIR,—I have much pleasure in stating that I was surprised yesterday in witnessing a case of Cholera which you treated, and cured the patient in a few hours.

From SHAIK DADUEBUX, *dated 4th February* 1861.

I FEEL myself highly glad to state that very lately when I was suffering from the effects of Cholera, I placed myself without losing a moment's time under the treatment of Mr. John Rebeiro, who, I am happy to find, has brought me round thoroughly from the hands of that plague. I give this certificate to him with the greatest pleasure, and I hope that he will, through the instrumentality of this note, obtain a few houses where this malady is prevailing.

We the undersigned have witnessed this cure.

(Sd.) SHAIK BABOOLLAH
and others attached to the Bengal
Secretariat Office Press.

From M. POWER, ESQ., *an Assistant, Bengal Secretariat, dated 13th March* 1861.

I HAVE much pleasure in certifying to Mr. Rebeiro's skill in treating Cholera by Dr. Honigberger's method, as exemplified in the case of a *syce* in my employ.

When Mr. Rebeiro was called in, the man had been suffering from symptoms of Cholera for a day previous, and from severe Cholera for some hours. Mr. Rebeiro inoculated him with Quassia, and applied other remedies with such effect, that the man was perfectly cured of Cholera when he left my house a few days ago.

From MR. A. D'CRUZ, *Bible Reader, Creek Row, dated* 15*th March* 1861.

CERTIFIED that Mr. J. Rebeiro attended on my daughter, free of charge, when she was lingering under the attack of Cholera and of whom I had no hope, and cured her so wonderfully by his good care, kind attention, and treatment under the hand of Providence, that he indeed surprised me and filled my heart with joy and gladness in restoring my dear daughter to me. I therefore confidently recommend him to the notice of the Public for their welfare to trust his medicine and treatment as the best remedy for Cholera, under the blessing of God.

From MRS. ANN MOREIRO, *dated* 21*st April* 1861.

SIR,—WITH extreme felicity I pen you these few lines, regarding your treatment and attendance on me during the time that I was attacked with that mortal disease, Cholera, and which will never be forgotten, although I cannot say that you had given me life, but your treatment, care and exertion saved me from the hands of death. I must consider myself a new-born, more so as the disease was too much for my age of about 70 years; and for which my prayers to the Giver of all good will be always for self and your family's long life and prosperity.

From MR. E. D' CRUZ, *Assistant Planter, Godghat Concern, Jessore, dated Godghat the* 18*th October* 1861.

SIR,—I HAVE much pleasure to inform you that the remarkable cure which I have caused through the miraculous influence of your tincture of Quassia from the fatal disorder which takes so many to the grave, "Cholera Morbus." I have to offer you my sincere thanks, coupled with those who recovered their lives in this district by the aid of your medicine, and would recommend the use of it to the suffering mankind as a valuable treatment to give speedy recovery in cases of Cholera. You are at liberty to make this known to your friends.

From MR. C. H. MANUEL, *Superintendent of Messrs. Scott and Co.'s Press, dated 5th March* 1864.

SIR,—AT your request I have much pleasure in stating your perfect success in the treatment of a case of "Cholera Morbus" which my friend, Mr. G. Harris, was attacked with. Your treatment I must say is simple and effective, and I feel confident that had it not been for your skill and exertions my friend would not have survived. Accept of my thanks for the trouble you have had.

From MR. G. HARRIS *of the East Indian Railway, dated 8th March* 1864.

THIS is to certify that Mr. J. Rebeiro attended on me on a very severe attack of Cholera. I attribute my re-

From MR. J. L. KINGHAM, *Superintendent of the Foreign Department Press, dated* 19*th March* 1864.

I HEREBY certify that Mr. John Rebeiro successfully treated me for a very bad attack of Cholera, and I recommend him with the greatest confidence.

SIR,—I have the pleasure herewith to enclose Currency Notes for Rupees (100) one hundred, for your acceptance, and beg to tender you my very best thanks for the care and attention you gave to my case.

From MR. W. J. BAMPTON, *Emaumbaug 2nd Lane, dated* 6*th April* 1864.

SIR,—I AM in receipt of your letter of the 4th instant, and agreably to your request I have no hesitation in bearing testimony to the cure you have effected in Mr. Kingham's case of Cholera by Dr. Honigberger's mode of treatment of that disease, and it would give me pleasure to hear that those who may be attacked with the baneful malady, will resort to you, and find in your possession the antidote which, in the name of humanity, you will readily administer to the praise of our Redeemer.

From MR. E. MARTYR, *Superintendent of Lights, Calcutta, dated* 16*th May* 1864.

SIR,—YOU wish me to state something in the shape of a testimonial concerning my boy's Cholera case. Conscientiously stating facts as it stood before I made over the case to you, he was treated by an English medical gentleman, whose name I must refrain committing in this paper, and under whose treatment he got worse. Hopeless as he became, and apparently in a dying state, by advice of friends and relatives he was put under your care, and Providentially in six days he slowly improved for the better, and now, wonderful to say, quite well of course; he cannot recover from his weakness soon.

Your remedies and inoculation treatment employed for the purpose, I must admit, were simple and efficacious, and your care and attention unceasing. Really I cannot restrain stating that as if the Lord had sent you to take care of my dying boy, and it is He alone who has effected the cure, through your agency. I now confidently recommend you to those suffering from Cholera, and in your possession I firmly believe is the actual medicine for the disease.

From Mr. H. Pemantle, *an Assistant in the Foreign Department, dated* 19*th May* 1864.

On Sunday, the 8th instant, I was suddenly called by a Mr. E. Martyr to see one of his sons, 12 years old, who was attacked by Cholera, and in a very precarious state. It was a case of Epidemic Cholera, and I have much pleasure to testify to the bare facts that had it not been for the valuable and timely aid afforded by Mr. John Rebeiro, (late with Dr. Honigberger), the patient, who was then in extreme agony, would have been a corpse on the same day. Upon my examining the boy I found that his pulse had sunk and collapsed, which continued for two days, but on the third day his appearance displayed a favorable change. I presume that in such a serious and helpless case the best professional medical men would have declined to undertake the task of treating the patient; nevertheless the very able manner in which Mr. John Rebeiro took the boy in hand had elicited the unqualified admiration of all who witnessed this rapid cure, and moreover earned for him the warmest thanks and gratitude from the patient's father and relatives, while I gratefully acknowledge the interposition of Divine Providence in this case; it must not be forgotten that the skilful and ingenious method by which the cure has been effected, was no less the work of Mr. John Rebeiro, whom I strongly recommend to the favourable notice of the public, who may have occasion to require his services in cases of Cholera, that direful and most virulent of all the diseases, which proves often fatal in this country.

A Statement by THOMAS JONES, ESQ., *Registrar, Bengal Secretariat, dated* 21*st May* 1864.

HAVING perused Mr. Pemantle's statement I have great satisfaction in bearing witness to the testimony which has reached me from several independent sources during the past four years in favour of the singular success which has attended the philanthrophic exertions of Mr. John Rebeiro.

From MR. J. R. SWARIES, *Reader, Military Orphan Press, dated* 23*rd May* 1864.

SIR,—I HAVE much pleasure in offering my sincere thanks for cure of Cholera by your most valuable Quassia. Your one inoculation and some of your Cholera mixture, effected a speady cure. It was through the will of Divine Providence and your medical aid that

I am now enjoying health. Had I not applied to you for relief I would have, by this time, been numbered amongst the dead. The attack brought me to its last stage, so far so that I was obliged to perform my last Christian duty, and the Holy Extreme Unction was administered to me. I shall never forget your certain cure for Cholera.

From C. H. DISSENT, ESQ., *Head Assistant, Judicial Branch of the Bengal Secretariat, dated* 8*th June* 1864.

I HAVE much pleasure in bearing testimony to the fact of Mr. John Rebeiro having cured a servant in my employ, who was attacked with all the symptoms of Cholera, and who was in a collapsed state when placed under his treatment. Mr. Rebeiro's care and attention to the case were unremitting.

From MR. M. DE SOUZA, *an Assistant, Revenue Branch of the Bengal Secretariat, dated* 8*th June* 1864.

To the many valuable certificates possessed by Mr. Rebeiro regarding the results of his treatment of Cholera by Quassia inoculation I beg to add my humble testimony. I am personally aware of the facts connected with the case of young Martyr, whom I found sinking fast under an attack, but who to my surprise, and to that of a great many others, recovered under Mr. Rebeiro's hands.

I may add, moreover, that among the poorer classes of the Calcutta community, Mr. Rebeiro is doing a great deal of good in this season of the year, by his exertions in combating that fearful malady.

From T. CAMPBELL, ESQ., *Supervisor Ferry Fund Roads, 24-Pergunnahs, dated Entally,* 15*th June* 1864.

A MEMBER of my family having taken unwell with symptoms of Cholera, I had occasion to send for Mr. John Rebeiro on the morning of the 16th ultimo, being apprehensive from the numerous deaths occurring in my neighbourhood from Cholera, that the disease might take a serious turn. However I am glad to state that one inoculation was sufficient to effect a cure.

One of my servants was attacked with the same disease on the same night, and was in a very precarious state; but Mr. Rebeiro having kindly undertaken to treat the man, brought him round in a short time, the inoculation by Quassia appears to me to be simple and effective.

From my personal observation of the case, *referred to, I can strongly recommend Mr. Rebeiro's mode of treatment in Cholera.

J. REBEIRO,

N: W. Corner of Wellington Square,

No. 3-1, *Bapareetollah Lane.*

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REPORT ON

IZAL,

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LIMITED

THE

NEW NON-POISONOUS DISINFECTANT.

BY

J. H. WORRALL, ESQ., F.C.S., F.I.C.

REPORT ON IZAL,

THE

NEW NON-POISONOUS DISINFECTANT,

By J H. WORRALL, Esq., F.C.S., F.I.C.

During a research into the nature of uses of the bye-products derived from the Thorncliffe Patent Coke Oven, I found that one of these products was an oil, which has not hitherto been described, and which differs so remarkably in its properties from coal tar, although obtained from coal, as to be unique in its character. From this oil I extracted a body which evidently possessed high antiseptic power. I estimated this power, by observing the length of time the new body would arrest the putrefaction of a putrefying liquid, and then compared it with pure crystallized carbolic acid.

The results clearly showed that its ***antiseptic power was considerably greater*** than that of this well-known antiseptic.

After undergoing a process of refinement, the new body was found to be a clear deep reddish brown liquid insoluble in and of greater density than water. Its mean boiling point is considerably higher than that of pure carbolic acid, and it has not the caustic action upon the skin as has that antiseptic; moreover, it is non-poisonous to the higher animal life.

All these properties are evidently of real importance in arresting putrefactive change or in the destruction of parasitic life, since they insure the antiseptic body remaining upon the part requiring disinfecting after it has once been there deposited. In order, however, to properly effect the latter object an antiseptic body insoluble in water is usually unsuitable, owing to the fact that water is the general medium of distribution. It is this fact which has caused most of the disinfectants hitherto advocated to be those that were soluble in water, and thus the means for their distribution became also the easy means for their removal from the part requiring disinfecting.

Upon careful consideration of these facts, I finally succeeded in so finely dividing this new antiseptic that its particles would remain permanently suspended in water, forming a beautiful milk-white emulsion. By this method the two important ***desiderata*** of a disinfectant were attained, viz., insolubility of the active constituent *in* water, and easy distribution *by* water. Thus **IZAL** consists of a powerful antiseptic body which is insoluble in water, but which is made into an emulsion for purposes of distribution.

The disinfectant itself remains liquid at all temperatures about 32°F., whilst a temperature of 212°F, instead of deteriorating, only tends to concentrate it. At these and all intermediate temperatures it will mix readily and perfectly with water in all proportions.

With respect to the application of this disinfectant to disinfecting purposes generally, and especially with regard to infectious diseases which are propagated by septic, toxic or zymotic microbes, the property which above all recommends itself for consideration is that of ***persistency***, which is without doubt due to the fact that the active constituent of the disinfectant has a

It naturally follows from this that, although a *spore* of a *bacillus* might not be immediately destroyed, the disinfectant would in all probability remain sufficiently long to destroy the *bacillus* evolved from that *spore,* and thus prevent further development. This I have proved to be true in the case of the *acarus ovis,* viz., the species *psoroptis communis* of the genus *psoroptes*. Here the time of egg incubation and larva development is 15 days, yet one treatment has been found sufficient to effect a complete cure of the disease originated by this *acarus,* proving that not only were the parents destroyed but the antiseptic body remained to destroy also any insects hatched from the eggs which the parents had deposited previous to their death. This seems to be a far more legitimate inference than that the eggs themselves had been destroyed.

The practical application of **IZAL** to the human patient has given most interesting and highly satisfactory results, and these are the more valuable as many of them have been under direct medical observation. As an antiseptic dressing for *wounds and bruises* one surgeon reports the result obtained with this disinfectant as most remarkable, and this after the usual antiseptic dressing had failed.

These facts and considerations enable me to point out the superiority of this new antiseptic body to the following well-known disinfectants, viz., to *corrosive sublimate* with respect to its non-poisonous action on human beings, to *carbolic acid* with respect to its non-poisonous action and higher antiseptic power, and to *potassium permanganate* with respect to its durableness.

Thorncliffe Collieries,
near Sheffield,
February 1st, 1892.

TREATMENT OF WOUNDS

IZAL.

NEWTON, CHAMBERS & Co. LIMITED

IMPERIAL 13.OCT.97. LIBRARY

BY

WM. BRUCE CLARKE, Esq., M.B. Oxon.,
F.R.C.S. Eng.,

ASSISTANT SURGEON TO ST. BARTHOLOMEW'S HOSPITAL, ETC.

Reprinted from *The Lancet* of July 1st, 1893.

TREATMENT OF WOUNDS WITH IZAL.

In November of last year Dr. Klein mentioned to me that he had been making some experiments with a new substance called "Izal,"* which exhibited very remarkable disinfectant properties, was non-irritant, and had at the same time no poisonous influence on any of the higher animals even in extremely concentrated solutions. After carefully reading Dr. Klein's report on the subject and the account of his experiments, and after conferring with him upon the subject, I determined to test its efficiency and its applicability as a surgical disinfectant, and now, after some six months' trial, I am anxious to record the result of my investigations; but before doing so it may be advisable to recall Dr. Klein's statements:—

"Now I have to add a simple statement with reference to all species mentioned as 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, and 25,† for in all these instances the disinfectant used in the strength of 1 in 200 completely destroys in five minutes the vitality of the microbes; no living cultures can be produced with them. The experiments were made at first also in this instance with the disinfectant of the strength of 1 in 100, exposing the microbes in it for five, ten, and fifteen minutes, and also to 1 in 200, exposure fifteen minutes; but it need hardly be said that all vitality was destroyed, as already 1 in 200 for five minutes is a complete disinfectant. (It may not be unnecessary to state here that the same cultivations of bacillus diphtheriæ and bacillus of typhoid used in this series of experiments—namely, exposure in the disinfectant of the strength of 1 in 200—were used, and with exactly the same methods also, for comparative experiments of disinfection with carbolic acid.) Crystals of absolute phenol were dissolved in water so as to form a solution of the strength of 1 in 200; the microbes were then introduced into this solution and exposed to its action for various periods. As a result it was found that an exposure for two hours in 0·5 per cent. carbolic acid—*i.e.*, 1 in 200—does not in the least injure the bacilli; good and typical growth can be established with them after the exposure. With regard to species 22, 23, and 24 (streptococci), these I knew from previous experiments with other disinfectants to be less resistant than the staphylococci and bacilli. I have therefore subjected these three species to the disinfectant in weaker strength—namely, 1 in 300—and found that an exposure for five minutes in this mixture is fatal to these microbes; streptococcus pyogenes, streptococcus of erysipelas, and streptococcus of scarlatina. From these series it follows that an exposure for five minutes in the strength of 1 in 200 (1 in 200 would mean one ounce of the disinfectant emulsion distributed in ten pints of water) completely destroys the vitality of the microbes of diphtheria, typhoid fever, fowl cholera, swine fever, glanders, cholera, of suppuration, of erysipelas, scarlatina, and other non-

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* The substance was at that time known by the term of the "Thorncliffe Disinfectant." It has since been renamed "Izal." It is a by-product obtained by Messrs. Newton, Chambers & Co., of the Thorncliffe Ironworks and Collieries, Sheffield, in the process of coke formation. They have been good enough to place some at my disposal for experimental purposes.

† "The microbes which have been experimented with were the following:—(1) Spores of bacillus subtilis (hay bacillus); (2) spores of bacillus mesentericus (a common putrefactive microbe); (3) spores of bacillus anthracis; (4) bacillus subtilis, non-spore bearing forms; (5) bacillus mesentericus, non-spore bearing forms; (6) bacillus anthracis of the blood of an animal dead of virulent anthrax; (7) bacillus of diphtheria; (8) bacillus of typhoid fever; (9) bacillus of glanders; (10) bacillus of septicæmia (mouse); (11) bacillus of fowl cholera; (12) bacillus of fowl enteritis; (13) bacillus of pneumonia; (14) bacillus of grouse disease; (15) bacillus of swine fever; (16) bacillus of swine erysipelas; (17) bacillus prodigiosus (pink), non-pathogenic; (18) spirillum of Finkler; (19) spirillum of cholera (cholera bacillus); (20) staphylococcus pyogenes aureus; (21) staphylococcus pyogenes albus; (22) streptococcus pyogenes; (23) strepto-

In addition to these experiments on the destruction of microbes, Dr. Klein made some researches as to the solutions that should be used with a view to inhibiting their growth, and states:

"The result of all experiments on inhibition may be briefly summarised for all the twenty-five species tested—namely, (1) spores do not germinate in medicated gelatine or broth if the amount of disinfectant added is 0·1 per cent.; (2) no micrococcus (staphylococci and streptococci) is capable of growing in medicated gelatine or broth of the strength of 0·1 per cent. medication; (3) all non-sporing bacilli and spirilla fail to grow in medicated gelatine or broth of the strength of 0·1 per cent. medication; (4) excepted from this are the bacillus prodigiosus and the bacillus of typhoid—the bacillus prodigiosus shows growth on gelatine medicated 0·1 per cent.; the growth is retarded, and always starts from the superficial layer of the medium; it proceeds considerably slower than on normal gelatine."

These exceptions obviously do not concern one from a surgical point of view, inasmuch as bacillus prodigiosus is not a pathogenic organism at all, and the bacillus of typhoid fever does not enter wounds. It follows from these experiments that for destructive purposes a solution of 1 in 200 of the fluid is all that is required, whilst for inhibition purposes 1 in 1,000 is quite sufficient. My task then was limited to determining how far solutions of this strength are available for surgical purposes and to ascertaining whether they possessed any advantages over the antiseptic solutions‡ in ordinary use, such as carbolic acid, corrosive sublimate, &c.

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‡ I have used the word "solution" here and in all subsequent instances in reference to this fluid "Izal," but to be strictly correct the word "emulsion" should be employed, and herein lies, in my opinion, at once the chief advantage and disadvantage of the fluid in question. Being an emulsion and not a clear solution it is not so easy to see one's instruments when they are covered by it. At the same time, it must be borne in mind

The cases in which I have used it have been selected by me because their behaviour under the more commonly used antiseptics is so well known that it may be regarded almost in the light of a control experiment as regards this new disinfectant. The samples of the fluid which were submitted to me were diluted down to a strength of 1 in 50, and kept in bottles ready for use, the subsequent dilution to 1 in 200 being effected at the actual time of operation. The sponges which were to be used at the operation were cleansed, as is my ordinary custom, in soda-and-water and then rinsed several times in fresh water until they no longer caused any turbidity in it. After this they were placed in a jar of Izal (1 in 200) and kept there for at least twenty-four hours before use. The gauze which was employed as a dressing was the ordinary gauze of commerce boiled for twenty minutes in a saucepan over the fire and then soaked for twenty-four hours at least in a solution of Izal (1 in 200) like the sponges. The gauze was wrung out just before use and placed in a moist condition over the wound without the intervention of any protective or other similar substance between it and the wound. A sufficient number of folds were used to allow for any possible soakage that could take place and the outside was then covered by any substance—*e.g.*, cotton wool, &c.—which happened to be at hand in order to prevent the bedclothes from being wetted. The instruments were immersed in the same fluid for a quarter of an hour and one's hands disinfected in it in the ordinary manner. As I am rarely in the habit of using ligatures and usually employ torsion in their stead, I have not

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that the very fact that the fluid is so singularly unable to form chemical compounds with living animal tissues is in all probability highly advantageous from the germicidal point of view. Unlike corrosive sublimate, which speedily loses its disinfectant power by combining with the albuminous substances of the body, Izal retains this power in such a remarkable degree because it will not combine with anything. It is also at the ordinary temperature of the air practically non-volatile, as may be easily tested by placing a few drops on a piece of cotton wool and leaving it for several months in an exposed position.

made use of ligatures prepared in this fluid on more than a very few occasions, but whenever I have done so the ligatures have in no single instance given the slightest trouble nor have they in any way retarded the healing of the wound, so that one may fairly conclude that it is at least as efficacious as carbolic acid for the purpose.

The cases in which I have made use of this fluid may be described under the following heads: (1) fresh operation wounds which were uncomplicated by ulcers, sinuses, &c.; (2) cases demanding special purification—*e.g.*, ulcers, &c., in which skin grafting by Thiersch's method was employed; (3) abscesses and sinuses of varying degrees of complexity, all of which were either septic to start with or at least contained pus; (4) sinuses in connection with mucous membranes, including fistulæ in communication with the urethra and a case of prostatic abscess opening both into the rectum and bladder; and (5) foul mucous membranes, such as bladders in a condition of cystitis and mouths rendered foul by operations undertaken in their neighbourhood.

FRESH OPERATION WOUND.

1. The first case in which Izal was employed by me was an ordinary case of breast cancer. The wound healed completely under a single dressing and no pain was experienced by the patient after the operation. The same remarks apply equally to two cases of radical cure of hernia. The first was of a simple nature, but the second was complicated by the presence of a large sac and a fair number of adhesions, but no subsequent pain was experienced. The wound assumed an aseptic course throughout. In a case of goitre in which the fluid was employed, one half of the gland, which was of considerable size, was dissected out and the fluid very freely used to the interior of the cavity. The jugular vein and recurrent laryngeal nerve were both exposed at the time and were freely bathed with Izal, but the subsequent course of the

case left nothing to be desired; and this is the more noteworthy, as with carbolic acid and corrosive sublimate there is often considerable constitutional disturbance—an occurrence which has been ascribed by some surgeons to the influence which these substances exert on the cardiac nerves which are derived from the vagus and pass down the neck.

SKIN GRAFTING.

2. Where large portions of skin have been lost through ulceration or in consequence of some extensive removal of a tumour, the skin can be speedily restored by the transplantation of skin after Thiersch's method. This method is, however, liable to fail owing to the difficulty of cleansing the surface, and it sometimes happens that the operation has to be performed a second time in order to ensure success in consequence of the difficulty which is experienced in thoroughly purifying the surface of the ulcer and the surrounding skin with the antiseptics ordinarily in use. On the three occasions on which I have employed Izal for this purpose, healing has taken place most readily and without the slightest difficulty.

THE PURIFICATION OF ABSCESSES AND OLD SINUSES.

3. For this purpose the antiseptics in ordinary use are of little avail unless the surfaces are very thoroughly scraped, and it is not always possible to effect this satisfactorily. This is especially the case with smaller sinuses, which often remain unhealed for weeks after the major portion of the wound has become soundly cicatrised. I first employed the fluid for washing out a psoas abscess and an abscess in connection with the hip-joint. In both cases the pus was first evacuated and the cavity was subsequently

flushed out with hot Izal (strength 1 in 200). Both the abscesses healed without further trouble and no subsequent constitutional disturbance ensued. I next made use of it in the case of two sinuses, one in connection with an old palmar ganglion which had become inflamed and burst externally, the other being situated in the region of the loin and of uncertain origin. Both were well distended under pressure with the fluid and both healed completely about ten days later. These two results are amongst the most striking which the employment of this fluid has yielded. The patient with the palmar ganglion had been attending amongst my out-patients for several months, as well as having been in hospital on more than one occasion, and all efforts which had been directed towards healing the sinus had failed. Several times it had become inflamed and had necessitated fresh incisions being made in the palm. After the cavity has been hyperdistended with the fluid, some considerable pain and uneasiness were experienced for upwards of forty-eight hours; after which it gradually subsided, and a soundly healed hand was the result. The other sinus cannot be regarded as being so striking an instance of the efficacy of the fluid, for though it healed rapidly its nature and exact extent were shrouded in mystery. After so excellent a result in the two sinuses just mentioned, I employed the fluid in the same strength in a case of suppurating knee-joint. The joint in question was freely opened, and was thoroughly scraped and flushed out. For a few days the pus diminished in quantity, the temperature fell, and the tenderness of the surrounding parts was lessened. The effect, however, was only temporary in character. The process was repeated a second time with double strength Izal—viz., 1 in 100,—but with no better permanent result. As each of these applications involved placing the patient under an anæsthetic it was not deemed advisable to make any further attempts at disinfection, and accordingly in this case Izal was no longer employed, and the joint was drained in the ordinary manner.

SINUSES IN CONNECTION WITH MUCOUS MEMBRANES.

4. Some of the sinuses of this nature with which one has to deal from time to time, may be classed amongst the most tiresome which are encountered in surgery, and perhaps amongst the most troublesome of all are those fistulæ which are in connection at the same time with the urethra, prostate and bladder. The first case of this nature in which I made use of Izal occurred in a patient who had a perineal fistula subsequently to urethral stricture. Though the calibre of the urethra was fully restored, the fistulous track refused to heal. It had been dilated, scraped and injected with various fluids, such as chloride of zinc, nitrate of silver, carbolic acid (1 in 20), &c., but all alike had failed, and rarely a day passed without a certain amount of urine trickling out of the fistula. It was injected with Izal, and a week later the urine ceased to come by the false track, which has remained permanently healed ever since—*i.e.*, for more than three months. The second case was that of a prostatic abscess which had burst both into the rectum and the urethra. A lateral cystotomy was performed, and the cavity scraped out with the finger and freely irrigated with the fluid. The wound completely healed in about five weeks without leaving any fistulous track behind.

THE EFFECT OF IZAL ON MUCOUS MEMBRANES.

It only remains to allude to the effect of the fluid on mucous membranes—for example, when it is made use of in cases of cystitis, or as a mouth and throat wash after operations on those parts. In all such cases it has invariably proved of the greatest benefit. Whilst it produces little or no irritation like carbolic acid, it is considerably more efficacious, and can of course readily be employed in inflammations of the mouth, nose, and throat, where a poisonous substance like corrosive sublimate is quite inadmissable.

CONCLUDING REMARKS.

From a consideration of Dr. Klein's experimental researches in connection with the substance, and from my own practical experience of it, I have no hesitation in saying that the antiseptic in question seems likely to prove more efficacious practically than any at present known. It will be obvious to any one who peruses critically the account of the cases in which I have employed it, that in many of the instances referred to it was put to a very severe test, and that by its aid some excellent results were obtained. At the same time it is equally clear that its behaviour under all circumstances must be submitted to the test of a more lengthy experience before one can be in a position to predict that exact place which it is destined to take amongst the antiseptic fluids of the future. One thing, however, is certain—viz., that the surgeon will rejoice to hear that at last an antiseptic has been found which is easy to use, does not irritate his own hands or his patient's skin, and is at the same time by far the most powerful with which he is yet acquainted.

Harley Street, W.

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IZAL

IN ITS SURGICAL ASPECTS.

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BY

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F.R.C.S., Eng.,

ASSISTANT SURGEON TO ST. BARTHOLOMEW'S HOSPITAL, ETC.

Reprint from "*St. Bartholomew's Hospital Journal,*"
September, 1894.

IZAL

IN ITS SURGICAL ASPECTS,

BY

W. BRUCE CLARKE, F.R.C.S.,

Assistant-Surgeon to the Hospital, and Lecturer on Anatomy.

FOR close upon two years I have scarcely used any other disinfectant than Izal; and gauze soaked in Izal has served me as a surgical dressing. I have employed Izal largely for irrigation purposes, as well as for my hands, sponges, and instruments. It is interesting therefore to see how far it has fulfilled its purpose, and what are its advantages and disadvantages as compared with carbolic acid and other more commonly employed antiseptics. It is to Dr. Klein that I am indebted for first drawing my attention to the valuable properties of which it is possessed. It had been submitted to him by Messrs. Newton, Chambers, & Co., of the Thorncliffe Ironworks and Collieries, near Sheffield, having been obtained by them as a bye-product during the process of coke manufacture. It is not uninteresting to turn for a moment to the steps which led up to its discovery, and the methods by which its antiseptic properties were first elucidated by rough experiment at the works before it was submitted by Dr. Klein to more rigid tests by means of which its full value was ascertained.

A chance crack in a gas retort caused the leakage into it of a small quantity of moisture, which, it is needless to say, was speedily converted into steam, and caused the coke to be produced at a much lower temperature, whilst an oily-looking substance fell to the bottom of the retort, and the smoke issuing from the chimney was reduced to a minimum. Step by step the nature of this oily material was investigated by Mr. Worrall, chemist to the Thorncliffe Works, and its exact composition ascertained. Several other bye-products of considerable value have been obtained, and the smoke which formerly issued from the chimneys of the works and blacken the country around has ceased to exist. The workmen who were engaged in the manufacture soon discovered that cuts dressed with Izal healed far more readily than those dressed by any other of the plans usually in vogue at the works, with the result that a sample was submitted to Dr. Klein for examination, who soon ascertained that it possessed very remarkable disinfectant properties, was non-irritant, and so far as the higher animals are concerned it exerted no poisonous influence whatsoever, even in very concentrated solutions. On the lower forms of life, however, its destructive properties proved to be very considerable.

The following is a quotation from Dr. Klein's statement :—

"Now I have to add a simple statement with reference to all species mentioned as 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, and 25,* for in all these instances the disinfectant used in the strength of 1 in 200 completely destroys in five minutes the vitality of the microbes ; no living cultures can be produced with them. The experiments were made at first also in this instance with the disinfectant of the strength or 1 in 100, exposing the microbes in it for five, ten and fifteen minutes; and also to 1 in 200, exposure fifteen minutes; but it need hardly be said that all vitality was destroyed, as already 1 in 200 for five minutes is a complete disinfectant. (It may not be unneccessary to state here that the same cultivations of bacillus diphtheriæ and bacillus of typhoid used in this series of experiments—namely, exposure in the disinfectant of the strength of 1 in 200—were used, and with exactly the same methods also, for comparative experiments of disinfection with carbolic acid). Crystals of absolute phenol were dissolved in water so as to form a solution of the strength of 1 in 200; the microbes were then introduced into this solution and exposed to its action for various periods. As a result it was found that an exposure for two hours in 0·5 per cent. carbolic acid, *i.e.*, 1 in 200, does not in the least injure the bacilli; good and typical growth can be established with them after the exposure. With regard to species 22, 23, and 24 (streptococci), these I knew from previous experiments with other disinfectants to be less resistant than the staphylococci and bacilli. I have, therefore, subjected these three species to the disinfectant in weaker strength, namely 1 in 300, and found that an exposure for five minutes in this mixture is fatal to these microbes, streptococcus pyogenes, streptococcus of erysipelas, and streptococcus of scarlatina. From these series it follows that an exposure for five minutes in the strength of 1 in 200 (1 in 200 would mean one ounce of the disinfectant emulsion distributed in ten pints of water) completely destroys the vitality of the microbes of diphtheria, typhoid fever, fowl cholera, swine fever, glanders, cholera, of suppuration, of erysipelas, scarlatina, and other non-sporing pathogenic and non-pathogenic species."

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* "The microbes which have been experimented with were the following; (1) Spores of bacillus subtilis (hay bacillus); (2) spores of bacillus mesentericus (a common putrefactive microbe); (3) spores of bacillus anthracis; (4) bacillus subtilis, non-spore bearing forms; (5) bacillus mesentericus, non-spore bearing forms; (6) bacillus anthracis of the blood of an animal dead of virulent anthrax; (7) bacillus of diphtheria; (8) bacillus of typhoid fever; (9) bacillus of glanders; (10) bacillus of septicæmia (mouse); (11) bacillus of fowl cholera; (12) bacillus of fowl enteritis; (13) bacillus of pneumonia; (14) bacillus of grouse disease; (15) bacillus of swine fever; (16) bacillus of swine erysipelas; (17) bacillus prodigiosus (pink), non-pathogenic; (18) spirillum of Finkler; (19) spirillum of cholera (cholera bacillus); (20) staphylococcus pyogenes aureus; (21) staphylococcus pyogenes albus; (22) streptococcus pyogenes; (23) streptococcus of erysipelas; (24) streptococcus of scarlatina; (25) proteus vulgaris (the common microbe of putrefaction)."

In addition to these experiments on the destruction of microbes, Dr. Klein made some researches as to the solutions that should be used with a view to inhibiting their growth, and states:—

"The result of all experiments on inhibition may be briefly summarised for all the 25 species tested, namely: (1) Spores do not germinate in medicated gelatine or broth if the amount of disinfectant added is 0·1 per cent.; (2) no micrococcus (staphylococci and streptococci) is capable of growing in medicated gelatine or broth of the strength of 0·1 per cent. medication; (3) all non-sporing bacilli and spirilla fail to grow in medicated gelatine or broth of the strength of 0·1 per cent. medication; (4) excepted from this are the bacillus prodigiosus and the bacillus of typhoid—the bacillus prodigiosus shows growth on gelatine medicated 0·1 per cent.; the growth is retarded, and always starts from the superficial layer of the medium; it proceeds considerably slower than on normal gelatine."

Starting from these experiments of Dr. Klein's I had some Izal mixed with water in the proportion of 1 to 200, and have used it much in the same way as any other disinfectant, such as carbolic acid, corrosive sublimate, &c. Pure Izal itself is so thick and almost glutinous, being in its natural condition about of the consistency of thick cream, that in practice it is convenient to have it diluted down somewhat before use, as it does not readily mix with water all in a moment,. but there is no reason why it should not be mixed immediately preceding an operation if care be taken in the process, and thus used it has the merit of portability; a drachm and a quarter in a pint of water makes a solution of the required strength (1 in 200). For washing out bladders, for throat gargles, or for ulcers it may be used weaker still, and yet with equally beneficial result.

Izal does not in reality form a solution at all when mixed with water, but only an emulsion. It will dissolve in caustic alkalies, but no longer retains its non-irritating character, which is so marked a characteristic of it whether in a pure or in a diluted condition. The pure substance has no irritating effect whatever on the skin, but is somewhat pungent to the taste. From a germicidal point of view this comparative inability to form chemical compounds is undoubtedly of considerable advantage. It cannot combine with the tissues of the body, and hence retains its germicidal properties for a lengthened period; and in this respect it differs greatly from such a disinfectant as corrosive sublimate, which by combining with the albuminous substances of the body, soon loses its power of disinfection.

Its employment for surgical dressings and ligatures.—The gauze which is used for this purpose is the ordinary gauze of commerce, and can be easily prepared by anyone. It is boiled for half an hour on two separate occasions in Izal (1 in 200), and then allowed to remain in the fluid in which it has been boiled until it is required for use. The surplus fluid is squeezed out, and the gauze applied like any other dressing. After the gauze has remained in the fluid for several days the fluid becomes almost clear, the Izal becoming fixed in the gauze. Ligatures can be prepared precisely in a similar fashion, though as a rule I have preferred to keep them in carbolic acid, which is clear, and enables one more readily to see exactly what one requires. In the case of sponges they are best cleaned by soaking them in a strong solution of washing soda (about a teacupful to a quart of water is ample) for twenty-four hours. After this they should be rinsed five or six times in ordinary water until they are perfectly clean, and then kept in Izal (1 in 200) until they are required for use. As Izal does not break up the blood clot like carbolic acid and corrosive sublimate, the difficulty of cleaning ones sponges and instruments after an operation is much less than with any other disinfectant ordinarily in use. In addition to its powerful germicidal properties it does not irritate the surgeon's hands or the patients' skin. This non-irritating character is further seen when it is employed either in washing out a peritoneal abscess, a foul bladder, or a stinking sinus. In one or two instances in which an old sinus has been hyperdistended with this fluid the effect has been very remarkable, and has caused it to heal with great rapidity, but the uncertainties which always surround the course and direction of any fistulous tract hold out but little hope of any drug panacea for their removal. It is however no small matter to feel that in using Izal one is employing a most powerful disinfectant, and at the same time one that is absolutely innocuous whether it is used for ordinary wound purposes, for washing out large abscesses, or to purify foul mucous membranes. I am well satisfied with it and shall not be easily induced to revert to the use of carbolic acid or sublimate.

THE PLAGUE.

Being a reprint of letters published in the Indian Mirror for allaying popular alarm and conciliating the people to the action of the Authorities.

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PREFACE.

This pamphlet which contains in a collective form, all the letters published in the "Indian Mirror" during the months of May to August, 1898, with the object of allaying popular alarm, is presented to the public in the hope that Sir John Woodburn who has already done so much to conciliate the people, by conceding to their wishes and relaxing the stringency of the Plague Regulations, by acting to the spirit of Lord Sandhurst's speech in which His Lordship is reported to have said that "it was the duty of every plague officer of every grade as much as possible to let persuation do the work of fear," will, in the exhuberance of the milk of human kindness in his heart, be graciously pleased to direct the withdrawal of the Plague Notification and the closure of the Manicktolla Isolation Hospital, as the separate plague Wards of the Medical College, the Mayo and the Campbell hospitals, as well as the Ward Plague Hospitals and the private hospitals in gentlemens' houses, will be sufficient to accomodate a large number of patients, in the event of the plague breaking out in its virulence in the ensuing winter ; but which the name of the Almighty, now being chanted by Hindoos, Mahomedans, and the Salvation Army in separate groups through the streets of Calcutta, must, it is the strong conviction of all devout men, keep at bay.

2, SOBHARAM BYSACK'S 1st LANE,
CALCUTTA.
30th September, 1898.

GOBIN CHUNDER DHUR

XVII J VIII

THE PLAGUE.

No. 1. TO THE EDITOR OF "THE INDIAN MIRROR." 1-5.

SIR.—The plague is spreading consternation throughout the town. The Health Officer has issued a notification, informing the people of the measures to be adopted to prevent the spread of the disease. There is one thing, to which I would draw the special attention of the authorities. I refer to the feelings and habits of my countrymen, which ought to be consulted. The seggregation camp, no dodbt, is one of the most salient measures which the Government has adopted. But the middle class people would not allow their families to go to the Camp nor would male members of such families go there. And they have every reason on their side. To prevent any misapprehension, it would be well if the authorities adopted the following measures :—

A. Those who have no objection to go to the segregation camp should be taken there.

B. But those who object to do so should be treated in their own homes by Assistant Surgeons, to be appointed by the Health Officer if necessary for this special purpose.

C. The pay of these Assistant Surgeons should be raised in the following manner :—

D. For every visit, which he might pay to a family, he should charge a cash fee of one rupee. He would give such prescription as might be necessary, which the patient would send to a dispensary and get the medicines at his own expense.

E. The Assistant Surgeon should allot to the patient a separate room in his house where no body should be permitted to go.

F. To carry out this segregation the Assistant Surgeon should keep a servant with the patient with strict orders that his directions are fully carried out. For this servant, a cash charge daily of four annas should be made.

29-4-98. GOBIN CHUNDER DHUR.

No. 2. 5-5

SIR.—I must thank you for inserting my letter on the above subject in a recent issue. The exodus, that had commenced from the town in consequence of the panic, caused by the report, that every body suffering from the disease, would be taken to the segregation camp for treatment, was something appaling, indeed. Crowds of men and women were seen thronging the streets of Calcutta; the thoroughfares presented a scene that was shocking; and the railway stations were so over-crowded, that many of those who had gone there, were obliged to return home, as the carriages were not sufficient to carry them away. But for the timely intimation by His Honor the Lieutenant-Governor of Bengal at last Saturday's meeting of the Legislative Council and the calm and unimpassioned and, deliberate statement, which Mr. Risley laid before it in reply to questions, put by the Honorable Messrs. Turner, Surendra Nath Bannerji and Norendra Nath Sen, Calcutta would have, by this time been more than half emptied and its streets would have presented a vacant appearance. His Honor had very wisely come to the determination, that the apprehensions, caused not only among the masses but also among the gentry of the city, would not be allayed except by a declaration from himself that those unfortunate men and women, who were attacked with, bubonic fever, would be treated in their homes, and accordingly His Honor declared from his seat in the Council, that no husbands would be separated from their wives, that wives would not be separated from their husbands, and that children would not be snatched away from their parents, and that every arrangement for their comfort would be made to provide for their treatment in the compounds of their own houses or in the spacious grounds of their garden-houses in the suburbs, just as it suited their wishes and inclinations. This declaration by His Honor had a very soothing effect, and induced the people not to quit their homes and start for Darjiling and other places, for which they had made arrangements at considerable expense and inconvenience to themselves. Now, a word or two for those who would be entrusted with the duty of looking after the town, and preventing the spread of the disease at this dreadful season. I refer to the guardians of our health, and to the myrmidons of the municipality. They must be specially warned by those who are better informed on the subject, the Commissioners of the several wards, not to create unnecessary panic among the masses. I cannot conclude this letter without saying a word to my own countrymen. They must remain calm and cool at the present crisis which threatens to visit Calcutta with a most direful epidemic. They must listen to the advice and abide by the instructions that may be issued by the Health Officer from time to time. They must disinfect their homes, keep themselves quite clean, not conceal anything from the authorities, and, if necessary, not object to inoculate themselves with the virus, which Professor Haffkine has discovered as a prophylactic against the disease, provided a Committee of medical officers, which I would beg leave to suggest, should be appointed specially to report upon the efficacy of the virus as an infallible remedy to prevent the spread of the epidemic, after a careful experiment for days together. The present crisis is an exceptional one, and we must be prepared to meet the enemy fully in the face at any hazard, and irrespective of any expense that might be required to be incurred for the purpose. We must remember the sufferings, which our fellow-brethren at Bombay had to endure by the visitation of the disease, with which we are being threatened. We must try to benefit by the experience, which we have acquired from heavy casualties that have occurred in the sister Presidency.

2-5-98. G. C. DHUR

No. 3. 8-5.

SIR,—I am glad, that Dr. Chambers has been appointed Inspector of Plague, as the plague-scare is still exercising the minds of the people to a certain extent, although business has been resumed, the carters and coolies having returned to their work. Nothing would be better than daily reports, showing the number of admissions into the plague and other hospitals, the number of patients, who had recovered and returned to their homes, and the mode of treatment, adopted in each case, and the number of deaths that take place. Such a statement of facts is sure to soothe the popular mind, and to restore confidence. A rumour has got abroad that His Honor the Lieutenant-Governor of Bengal was to be inoculated. How far this rumour is correct, I cannot say, be that as it may, and supposing His Honor was inoculated, that is no reason, that inoculation should be forced upon the people. We must remember, that there is a great difference between the constitution of an European and an Indian. The former is strong, and can, therefore, withstand the power of a strong poison. The latter is weak, and may not do so. It is, therefore, essential that different modes of treatment should be adopted in two different cases. What the Corporation should be most anxious about is the health and conservancy of the town at the present juncture. If inoculation is to be made popular at all, and the confidence of the public created in it,—it must be gradually introduced. It would be better to inoculate a person with a weak poison twice than with a strong one, once for all. The Commissioners of each ward, if necessary, should be first inoculated, as they are supposed to be the most intelligent members of the Indian community, in order to induce the other sections of the community to come forward, and to get themselves inoculated with alacrity. The object with us all should be the prevention, and not the spread of alarm.

6-5-98.

G. C. DHUR.

No. 4.

11-5.

SIR,—I regret, that Mr. Ganguly has written a long letter, in which he stigmatises you as a faddist. Simply because in all that you have written on the above subject, you have told the truth, nothing but the truth, the whole truth, most fearlessly and independently. He says that, because you accepted the truth of Theosophy from a foreigner, you are bound to accept Mr. Haffkine's theory of inoculation and segregation. You must recollect, that Mr. Haffkine is an inoculationist. Mr. Haffkine is a foreigner. He had got hold of the ears of the Bombay Government, which looked upon him as a prophet, and in spite of the deaths of hundreds and thousands of the people of that Presidency, his theory of inoculation found favor. Dr, Blaney has already condemned Mr. Haffkine's theory of segregation. Drs. Sanders and Wallace have also condemned his theory of inoculation. It is a pity, that Dr. Cunningham is not here at the present time. Mr. Sparkes, of the eminent firm of Messrs. Dignam Robinson, and Sparkes, has come forward and written a letter to the *Indian Daily News*, in which he says, that he cannot understand, why, Mr. Haffkine's views should find favor with the Government in a matter, in which the lives and deaths of thousands of Her Majesty's subjects are concerned, in spite of the testimony of eminent medical men that are arrayed against him? Calcutta is being deserted still. Our servants and cooks are leaving us. It is difficult to shave our heads for want of barbers. It is still more difficult to get washermen to wash our clothes. The mercantile community are meeting with the greatest difficulty in removing their goods, and working their godowns for want of sufficient coolies. Can the Metropolis of British India be reduced to a more wretched and pitiable condition than this? I ask—who is responsible for this deplorable state of things? It is high time, that Sir John Woodburn should interfere, and put a stop to the present muddle, and issue stringent instructions not to harass but to conciliate the people. I write in the interests of the public, and am open to correction. My object is the greatest good of the greatest number.

9-5-98. G. C. DHUR.

No. 5. INOCULATION AND RAJAH BENOY KRISHNA. 22-5.

Sir,—The thanks of the community are due to Rajah Binoya Krishna Bahadur to get himself and the members of his family and servants and relatives inoculated by Dr. Cook. I trust, other gentlemen, equal to him in rank, wealth, and position, will follow his excellent example, and get themselves inoculated with similar successful results, in order to remove the prejudice of the populace against inoculation, and to create a confidence in it. I have seen numbers of men, women, and children flock into vaccination wards. Cannot the duties of inoculating with the plague verus be entrusted to the Superintendent of Vaccination?

16-5-98. G. C. DHUR.

No. 6. HOUSE TO HOUSE VISITATION SCARE. 22-5.

SIR,—The segregation and inoculation-scare have done great mischief and it has cost Government much trouble and anxiety to remove the prejudices of the people against them Whether the house-to-house-visitation-scare will cause the same mischief time and experience will show. I would, therefore, specially entreat those entrusted with the duties to proceed with the utmost caution, and not to do anything, that might ruffle the feelings of the people. You, Mr. Editor, are a Ward Commissioner, and have been entrusted with the duty of forming a Vigilance Committee in your own ward. You ought, therefore, to give your experience in the columns of your valuable journal daily as you proceed with the work of house-to-house visitation and the best and the safest means of getting on with it.

16-5-98. G. C. DHUR.

No. 7. SIR JOHN WOODBURN AND THE PLAGUE. 26-5.

SIR,—I regret, that Sir John Woodburn has been compelled by ill-health to quit the metropolis at the present crisis. His Honor was quite reluctant to do so, and, therefore, stayed here for some time in spite of his indisposition, but the cammands of his medical advisers were imperative. Any other Governor, in the present critical situation of His Honor's health, would not most probably have stayed so long in Calcutta, as Sir John Woodburn has done, for the sake of the millions of the people, confided to his charge. If he had done so perhaps, his health would have gone from bad to worse, and the more and more we would have suffered for want of his advice, guidance, and action in which he is always actuated by a benevolent regard for the feelings and wishes of the poor masses who are ignorant and superstitious. The masses, as we all know, are credulous and prone to beleive all wild stories and absurd rumours that are circulated in the town from time to time. Hence it was that they put their faith in all reports about segregation and inoculation, which it was the interest of evil-doers to carry from door to door with the object of alarming the people Hence, it is that Calcutta presents a vacant appearance, that it has become half empty, that there have been strikes amongst cartmen, coolies, *mehters*, *dhangars*; that we are suffering from want of servants, cooks, washermen. and bearers, who have proceeded to their native villages, in spite of all the persuasions of our educated countrymen, who are doing their best to dissuade them from taking such a step, for fear of being inoculated or segregated exclaiming, that they would rather starve in their own homes than meet with an ignominious death in an isolated hospital, far away from their fathers, mothers, brothers, sisters, wives, daughters, and other relatives. But the segregation and inoculation-scares, which have done incalculable mischief, are gradually dying out, by the announcement, under the signature of Mr. Risley, that no one is to be forcibly inoculated against his will, and that no one is to be snatched away from his home to the segregation hospital. Now, Mr. Editor, you have already written emphatically about the house-to-house-visitation-scare, about which we cannot be too cautious. If this scare goes to create any alarm, we ourselves would be to blame as the Government has in its wisdom, confided to us the work of forming Vigilance Committees, and visiting people from house to house with the object of allaying false alarm, and creating confidence in all the acts of the authorities regarding the plague, which is alleged to be prevailing in the city. It is good that, although Sir John Woodburn has been obliged to leave us, for a time, he is still so near us as to be able to lead the helm of the State in the present most critical juncture. I hope and trust, that Sir John Woodburn would, by the blessing of Providence, be restored to health by his stay at Darjiling, and be soon back amongst us in renewed vigour and health to see things with his own eyes, and hear with his own ears the cries and lamentations of the poor, and at once take the necessary steps to remedy their complaints and grievances.

23-5-98. G. C. DHUR.

No. 8. A DAY OF GENERAL PRAYER. 29·5.

Sir,—I would suggest, that a day of general prayer be observed in all Churches, Chapels, Musjids, Brahmo Samajes, Hindu temples, and all places of public worship for offering the most humble prayers on behalf of the poor people of Calcutta, who are threatened with an outbreak of plague in this city, by those who have the charge of all sacred places of worship and prayer, to the Almighty God, for stretching forth His arm to rescue the sufferers from the dangers of an epidemic, which is staring them in the face. I have no doubt that, if such devout colors and creeds, they cannot fail to move the Giver of all that is good, to shower His blessings upon the poor and panic-stricken population of this city.

27-5-98. G. C. DHUR.

No. 9. SANKIRTAN PARTIES, 1-.6.

SIR.—In previous years, when an epidemic of cholera or small-pox appeared in the city, Sankirtan parties used to be formed in different parts of the town. They chanted hymns, and went from door to door in groups, singing the name of *Hari* (God) in loud chorus with a view to drive away the epidemic. I do not see any reason why similar parties should not be formed at the present season, when the fear of the alleged plague is driving the people mad. Nor do I see any harm if those, who are religiously inclined, were to start every evening from their homes, and sing the name of the Almighty, which, they believe, is sufficient to scare away any danger, with which they might be threatened. This would, besides, be in consonance with the popular belief, which cannot but give courage to the masses, and dispose them to think that the plague must now disappear, and, therefore, they should not quit the city in large numbers, as they had hitherto been doing. Hallelujahs, when pronounced in right earnest with a devout and sincere heart, must approach the Throne of the Almighty God, the Great Disposer of our destinies and all future events, and, in the end, lead to a mitigation of the horrors of plagues and epidemics, with which we might happen to be visited. This is the opinion of all devout religious bodies, to whatever creeds they might belong, and, I must say, cannot but exert its influence upon the popular mind, and be attended with the most beneficial results. I dare say, Mr. Editor, you will agree with me in thinking that where people are found to repose their utmost confidence in Providence, they must, in the natural course of events, be freed sooner or later from the coming danger. Cannot Sankirtan parties be formed in parts of the town to encourage the masses to stick to their homes under the belief, which can by no means be removed from their minds, that now the real warfare has commenced, and that the dire enemy, the much-dreaded plague, must be beaten and driven away with force and the dangers with which we are now threatened will be averted.

30-5-98. G. C. DHUR.

No. 10. THE PLAGUE & THE PROPOSED CONFERENCE. 1-6.

SIR,—The thanks of the community are due to you for your able editorial in yesterday's issue, in which you suggest a Conference of all the public bodies in Calcutta for the discussion of measures, which should be adopted to allay the panic, which is prevailing in the city. This is a matter of vital importance, not only to the Indian inhabitants, but also to all European merchants and traders, who are interested in the peace and prosperity of the town. Messrs. Mitchell Bardslay and Co., of New China Bazar, have written a letter, which you published in your local columns, in which they wish that the Chamber of Commerce should give their best attention to the adoption of measures, which would restore confidence. They also suggest, that the plague-inoculation might be entrusted to the small-pox inoculators. Perhaps, you will remember that, I suggested the same thing in one of my letters to you. It should be a common object with us all to see that Calcutta is not denuded of its inhabitants, and that no time is lost in taking vigorous action to put a stop to the present deplorable state of things. A conference, like the one you suggest wherein all public bodies should be united, would prove the best panacea for all the evils, from which we are at present suffering. The resolutions, which such a Conference might arrive at when forwarded to Government, would carry great weight, and prove highly serviceable to us. The experience, of all the best men, who have got great interest at stake in the town when brought together and when put into proper shape, would show the extent of our real sufferings and enlist the sympathies of our rulers. You have said, that most of the medical men are agreed that segregation is not necessary to prevent the spread of the plague. You have also referred to certain Conferences of the most scientific men in Europe, in which after grave and mature deliberation, the conclusion arrived at was, that plague is not communicated to the servants who attend upon, and come in daily contact with patients, suffering from the disease. If such proof is adduced and placed before the authorities by such a Conference as you propose, the Government will have no alternative left but to give every consideration to the suggestion made by it. Already public opinion may be said to have been stifled in Calcutta, as the public journalist, who would dare to speak the truth, and nothing but the truth that might prove unpalatable to the powers that be, would run the risk of being publicly prosecuted. Under such circumstances a person, however philanthropic he may be, and anxious to serve the public, would hesitate before venturing to expose acts and measures of the Government, with the Sedition Act staring him in the face. At present, we are placed in the horns of a dilemma, from which it would be difficult to extricate ourselves, unless such measures as can cope with the dire consequences of an epidemic with which we are threatened, are at once adopted. If, then, we are really anxious to see things boldly in the face, and to fight the battle that is waging before us, no other body can be competent to do so than the Conference, to which reference has already been made.

G. C. DHUR.

27-5-98.

No. 11. THE PLAGUE. 2-6.

Sir,—You inserted in your issue of this morning a letter from Assistant Surgeon Rakhal Dass Ghose, L. M. S., in which he gives several reasons with a view to show, that should home-segregation be resorted to in every instance, instead of isolation to a segregation hospital, the results will be most beneficial, and tend to allay the fears of the people. The suggestion made appears to be, very reasonable, and coming as it does from a medical practitioner of experience in the city, it ought to carry weight with the authorities. The question, which appears to us to be of the most paramount importance at the present time, is whether the plague, in its direst form, is raging in the city, such as decimated a large portion of the population of Bombay. Thank God that this is not the case. There have up to the 26th instant been altogether 67 cases of plague and 52 deaths. Whether all the cases reported were real cases of plague, seems to be questionable. The information furnished in the statistics daily published by the Municipality, is not so complete as to justify the hubbub, that has been caused, and is denuding the town of its inhabitants. In the first place, it is asserted, that the Bombay plague, if imported, must come to us from sea-coast-towns. The vessels that come here, must touch *en route* Madras and the coast-towns before reaching us. If, therefore, the Bombay plague has appeared in our city, it must have first made its appearance in Madras and the coast towns. But we do not hear that it has already appeared in those towns. How, then, has it come to us if it has not been imported by steamers. The only route then, by which it can approach us, must be by the Railway. We have already heard reports that it has broken out in the Punjab. How is it, then that it has not made its appearance at Delhi, Agra, Lucknow, Allahabad, Benares, and Patna? Has it overtopped all those places, and come to us? I pause for a reply. I do not see any reason why the Government should be importing a large number of plague practitioners from Bombay at an enormous expense. The importation of a few of these gentlemen would have sufficed for the present. They could have rendered important services to us, when needed, by their advice and counsel to the experienced European and Indian medical practitioners who are already maintained here at a large expense by the Government. The combined experience of the Calcutta and Bombay medical practitioners would have proved sufficiently strong to arrest the tide of popular prejudice against the mode of treatment, which would have been adopted to prevent the havoc, which, it was feared, the plague would have caused, if precautionary measures were not taken beforehand. We all know, that whenever a case of plague occurred in Bombay, it was followed by several other attacks in the same house-hold, and the havoc committed was great. I would now ask the Municipality to be good enough to furnish us with statistics as to how many cases of plague have appeared in the same house, where a single case first occurred. I have already said that the information, furnished by that body, was not complete as regards the cases of plague, and the mortality arising therefrom in this city. I would suggest, that columns be added to the statistics, showing saparately the total number of cases that occur, the number of doubtful cases, the number of deaths that take place, with remarks in a separate column, stating how many of those cases were simple fever cases or cases of cholera &c., and the number of days each patient stayed in hospital, whether cured or dead. Statistics, furnished in this way, would be of vital importance, and show the nature of the several cases that occur, and pass by the name of plague.

28-5-98.

G. C. Dhur.

No. 12. THE SEGREGATION-SCARE. 10-6.

Sir,—I regret that the plague-scare is doing great mischief in the town. The merchants are suffering on account of scarcity of coolies, cartmen, and boatmen. The landholders are suffering from the loss of their tenants, who are leaving the city, and the general public from want of menial servants of all classes. The Municipal coffers must suffer also by the loss of rates and taxes, and the Government by the loss of custom and other revenues. I must say that we ought to be grateful to the Government for what it has done to prevent the mischief. The inoculation-scare is dying away, but the segregation-scare is still increasing. The Government, under the rules of the Venice Convention, is bound to observe them to prevent the spread of the plague. The Venice Convention held that segregation was one of the best means, that could be adopted to prevent the plague taking an epidemic form, but the question is, whether the Convention meant that by segregation the patient was to be separated from the other members of the family, and placed in a separate apartment of the house, occupied by them, or that he was to be taken for treatment to a plague hospital. That the latter was not the intention of the Convention seems to be evident from the concession already made by Government that the member of a family, attacked with the plague, might be lodged in a separate apartment of a house, subject to the approval of the authorities. Then, why remove patients of the poorer classes to the Manicktollah Hospital, if they dread to be taken there? Then, why not allow them to be treated in their own houses? This is very necessary to remove the segregation-scare from the minds of the masses. I make this suggestion in all humility, and in deference to His Honor the Lieutenant-Governor of Bengal and the Chairman of the Corporation of Calcutta; and I trust, that they will be pleased to take the matter into their serious consideration.

9-5-98. G. C. DHUR.

No. 13. 11-6.

SIR,—In my last letter, which you were good enough to publish in your issue of the 10th instant, I stated that, in order to disabuse the minds of the masses of the segregation-scare, they should be treated in separate apartments of their own houses by their own doctors, where this was possible, under the supervision of the Health Officer and his Assistants. But in cases, where the accommodation for this purpose was not considered sufficient or this could not be done for other reasons, the patients of the poorer classes might be treated in the Ward Hospitals, which the Commissioners have opened in their respective wards, under instructions from the authorities. This would be in consonance with the feelings, habits, and customs of the people, and, in no way, calculated to raise unnecessary alarm in their minds regarding the intentions of Government, which the evil-doers are spreading in the town to serve their own ends. Further, an option might be given to the poorer classes to carry their own sick relatives, when suffering from fever or other disease in conveyances, hired by them for the purpose to the Mayo, Medical College, Campbell or Chadney Hospital, where separate wards for plague patients might be opened for the purpose of being treated by the doctors of those institutions, under the supervision of Dr. Cook or his Bombay assistants if necessary. At present, matters are taking a serious turn in Calcutta, which might not be known to the authorities, and which few from a panic, which is intense. The people are leaving in large numbers, as they consider their hearths and homes, which the Indians think to be sacred, and do not like to be invaded by Police officers. I can say without any fear of contradiction that the alarm now created is wide spread. Now, one cannot but lament the condition, to which the city has been reduced, when he chooses to take a round about it. He must find that the lanes are not frequented by half the number of persons as before, that the *bustis* have been nearly half deserted, the huts are occupied either by a few persons or not occupied at all. Can the Metropolis of British India, inhabited by merchant-princes of untold wealth, by the aristrocacy and gentry of the land, who are possessed of the riches and treasures of a Crœsus, the most healthy and sanitary on account of its cleanliness and drainage and water-works, be reduced to a more pitiable condition than this? If all this is not sufficient to rouse our public bodies to combine and lay their grievances before Government, and pray for redress, I know not what will? I know, Mr. Editor, you have been endeavouring to render great service to the public at the present crisis. You have already suggested the conference of all public bodies which, in my opinion, should at once be formed to meet daily at the rooms of the Chamber of Commerce, at such an hour as might be convenient to each member in this grilling weather, pass Resolutions, and send them on to Government for consideration and orders. You have also suggested that, during the stay of His Honor the Lieutenant-Governor at Darjiling, the Plague Commission should hold meetings in order to ascertain the present state of public feeling regarding the plague and segregation-scare and adopt steps to allay the popular alarm. But if your cries are not heard, you must be crying in a wilderness. But there will be no help for all that. In spite of all adverse circumstances, however, I must insist upon you to continue in your endeavors to serve the public, as you have hitherto done.

10-6-98. G. C. DHUR.

No. 14. THE AMBULANCE. 12-6.

SIR,—I am glad, that the objection to the use of the ambulance by the people, has attracted the attention of the authorities, Mr. Greer, the Officiating Chairman, will be doing a good service, if he can introduce the use of the *Palki*. If Uriah bearers cannot be found to carry plague patients in *Palkis*, *Romonis* or up-country bearers may be employed on the duty. *Palkis*, which have no cloth covering inside, may be used, as they can be easily disinfected. Thus, one of the chief objections to the segregation-scare will be removed. Supposing that the services of the last-mentioned class of bearers cannot be secured, there will be no alternative left but to employ other low-caste bearers, as no respectable Hindu requires to be carried to the segregation hospital by the authorities. They must be treated in their own houses or in the hospitals, started by the Ward Committees. The ambulance, without a cover, may be comfortable. But that is not the question. What is needed, under the present circumstances, is that we should do our best to reconcile the people, the majority of whom are ignorant to the action of the authorities regarding the plague. The object with us all is to remove the popular prejudice against segregation. If the people object to be taken to the Manicktollah Hospital, they cannot object to go to the Medical College Hospital.

11-6-98. G. C. DHUR.

No. 15. SUSPECTED CASES OF PLAGUE. 14-6.

SIR,—There ought to be a line of demarcation, drawn between suspected and real cases of plague. The word "suspected" is calculated to mislead, and it were to be wished, that there had been no occasion to use it at all, especially in regard to plague matters in which the intentions of Government are liable to be misinterpreted and misunderstood chiefly by the ignorant masses. The best means, that suggests itself to me is that suspected cases should not be interfered with and left alone, or if this is not possible, they should be removed to a contiguous Hospital, where they can be lodged in a separate ward to be watched by the House Surgeon with a view to see whether the plague developes in such cases, and a report thereon furnished to the Corporation, and published daily for the information of the public. This is an important point in connection with the plague, which deserves the special attention of the authorities, and ought to be attended to without loss of time.

11-6-98. G. C. DHUR.

No. 16. PRIVATE HOSPITALS. 14-6.

SIR,—The Chairman of the Corporation, the Health Officer, and his Assistants are doing a real service to the inhabitants of Calcutta by allowing them to use the tops of their houses for the purpose of segregation hospitals, in the event of plague breaking out in their families. But in most cases, the residents are put to unnecessary expense and inconvenience for erecting temporary sheds for the purpose. These sheds, however, would not be half so comfortable as the *Baitukhanas* or outer apartments of a Hindu gentleman's family residence. Those who are acquainted with the arrangements of the family residences of Hindus, must be aware, that they are divided into two blocks. An inner block, wherein the ladies are provided with accommodation for culinery and bathing purposes, as well as with apartments wherein they stop during night and day. The outer block consists of apartments wherein the male members of the family stop during the day and a part of the night, the younger members using a portion of them for reading-rooms and the elder ones occupying other portions for purposes of rest and recreation. I would take the liberty to suggest, that a portion of the outer apartments be set apart for the purposes of the segregation hospital, as well as for providing patients, suffering from the plague with such comforts as they might need. The medical practitioner, who might attend on such patients, would find a portion of these apartments to be well adapted for the purposes, for which segregation hospitals are intended. Where the outer block may appear to the Health Officer or his at, would be attained. And any delay in granting a license for segregation hospitals in gentlemen's houses by the Chairman of the Corporation would be removed. But there would be exceptional cases, in which the outer block of a gentleman's house might be found fault with as being not properly ventilated, and not, therefore, well adapted for the purposes of a segregation hospital. In such cases only should the tops of houses be used and temporary sheds erected for a segregation hospital. The object of the authorities should be not to put the people to any inconvenience and expense, where this can be avoided. I beg to draw the special attention of Dr. Cook and his Assistants to this point, and trust that the suggestion, I have ventured to make, will receive such consideration in their hands as it deserves.

12-6-98.

G. C. Dhur.

No. 17. THE WARD HOSPITALS IN CALCUTTA. 16-6.

Sir,—I should like to know what arrangements the several Ward-Committees have succeeded in making to treat plague patients in the hospitals, proposed to be opened by them, and for which the members of the Vigilance Committees have been knocking about from door to door, raising subscriptions for the purpose. I ask this question in good faith to prevent Dr. Cook and his Assistants from being put to the necessity of removing plague patients to the Isolation Hospital at Maniktollah, and allay the popular apprehension of being forcibly taken there. The members of the Vigilance Committees ought to be on the sharp look-out for plague patients in their respective Wards after providing the required accommodation and necessary beds and other appurtenances for their use. Cannot a notification be issued by the Chairman of the Corporation telling the public that they should immediately report those who are in charge of the respective Ward Hospitals the occurrence of a plague in their houses? This is very necessary, as the public mind at present is very much agitated, and we should endeavour our best to reconcile it to the visitation, which an all-wise Providence has been pleased to send amongst us, for reasons best known to Him. To be fore-warned is to be fore-armed, and we should do our best to be prepared to meet the dire enemy bravely and manfully in the face. No human arrangement could be too perfect to enable it to meet fully the requirements of the emergency that has arisen, and for which every body, rich and poor, high and low, weak and strong, is suffering more or less. Of course, those who have been fortunate enough not to be visited by the plague in their houses, ought to be grateful to the Giver of all Blessings for having escaped it up to the present time. Those who live in palatial residences, and have had licenses granted to them to erect temporary hospitals in their houses or in their gardens in the suburbs to provide for the emergency, should thank the authorities, and feel themselves secure from dangers of any member of their families being forcibly carried to the segregation hospital. But our thoughts ought to be directed to the poor and I raise my voice for them in order that the several Vigilance Committees may be prepared not to allow them to be snatched away.

14-6-98.

G. C. Dhur.

No. 18. THE AMBULANCE VAN. 17-6.

Sir,—In a recent issue of your paper, you inserted a letter from a correspondent, in which he strongly condemned the ambulance cart. I have not seen the cart myself. You, Mr. Editor, should inspect it yourself as a Commissioner, and give us a minute description of it. From what I hear, a rumour is afloat that the people dread it more than death itself. They say that when a patient is put into it, his sufferings are great, and the disinfectants make the van more uncomfortable. For some three or four days, the town was quiet and the exodus was not great as *palkis* and hackneys were substituted for it. But during the last two days, the exodus for some reason or other has been rather large. An enquiry should be made into the truth or otherwise of the rumour that the ambulance van is being used again. If this is not the case, the rumour should be authoritatively contradicted. At any rate, the use of the ambulance should be entirely discontinued, as the people have great prejudice against it.

What is the delay as to the formation of a conference of all the public bodies, as you suggested. We should not lose a moment's time in forming it at the present juncture, which is fraught with the most imminent danger. The Indians are not only suffering for want of servants, but our European brethren are also suffering likewise. In support of this statement, I give below a copy of a letter which I have received from Messrs. Jas. Lauter & Co. Veterinary Surgeons, which runs as follows :—

"On account of the plague (*golmal*,) the farriers, *syces*, coolies have all run away from the town, so it is too much inconvenient for us to execute the order promptly. Our farrier has not run away, but he is absent on account of the *Mohurrum*, please send your horse day after to-morrow." I leave the letter to speak for itself. The inconvenience, to which I was put, can be better imagined than described ; and I believe, my fellow-brethren are also suffering from similar inconveniences daily. The Conference should, therefore, I repeat, be formed at once, meet daily, record Resolutions and send them on to Government every day.

G. C. DHUR.

No. 19. WARD HOSPITAL. 19-6.

SIR,—An alarm now and then gets abroad in the town, which, I believe, in most cases, will be found to be groundless, that a person, suspected to be suffering from an attack of plague, has been carried away to the isolation hospital at Manicktollah. The evil-doers, who are intent upon spreading such false and mischievous reports, get hold of the opportunity thus afforded, and try their best to create ill-feeling amongst the masses against the action of the authorities. The best means, which occurs to me as calculated to check the alarm caused in this way, would be for the Chairman of the Corporation, to make it as widely known as possible by the issue of a notification to be published under his authority in the daily newspapers, and by beat of drum, that the several Ward Committees have already opened separate hospitals for the treatment of hospitals in conveyances which their friends or relatives might hire either at their own expense, or at the expense of the Ward Committee concerned. Some of the Ward Committees have already engaged the services of Assistant Surgeons, *i.e.*, Indian Doctors, who will stop in the hospitals as House Surgeons during night and day, and Hakims and Kabirajes for their treatment under the supervision of European Surgeons. I know that this arrangement has already been sanctioned in Ward No. 8. As I was present at the meeting of the Vigilance Committee, at which authority was given to open two hospitals, one at Tarachand Dutt's Street for the treatment exclusively of the Mahomedan patients, and the other at Eden Hospital Street—for the treatment of Hindu patients, I think that a better arrangement than this could not be adopted, and this should be made known as widely as possible. In order to soothe the public mind, and to allay the unnecessary apprehensions that are daily getting abroad, I am glad to say that the Chairman of the Corporation is affording every facility for the opening of these hospitals, and District Medical Officers are also acting in a praiseworthy manner in inspecting private residences of Indian gentlemen for the establishment of private hospitals.

17-6-98.

G. C. DHUR.

No. 20. PLAGUE PRECAUTIONS. 22-6.

SIR,—Our best thanks are due to you for the extracts which you have published in your paper of the 16th instant, containing the opinions of European medical experts on the question of the plague precautionary measures. Those extracts ought to be made known as widely as possible, as they contain the experiences of first-class European medical gentlemen in regard to the arrangements necessary for the treatment of plague cases. Dr. Wedderburn, it seems, is opposed to inoculation and segregation. The opinions of other medical gentlemen, which you have extracted, also lead to the same conclusion. Now, then, who is to decide when doctors disagree? Under present circumstances situated as we are, threatened by the plague, and still more threatened with the prospect of our being forcibly removed to the segregation hospitals, if any of us with our families are attacked with the plague before the private hospitals in our houses are ready, as it is difficult to get sufficient workmen in these days. The best plan that seems to me to be adapted to the present exigencies, therefore, would be, I repeat, to allow Indian gentlemen's ground-floor rooms in the outer part of their houses to be used as private hospitals The treatment in such cases must, of course, be left to the family doctor. The advice of European physicians to be taken when necessary but this must be left to the discretion of the head of the family, as in other cases of disease in which he tries his best to save the life of a member of his family.

20-6-98.

G. C. DHUR.

No. 21. PRIVATE HOSPITALS. 23-6.

might be allowed to be used as segregation hospitals for the use of plague patients. I have heard from certain quarters that objection might be raised to the use of ground-floor rooms for this purpose on account of their humidity. But cannot the dampness of such rooms be prevented by the same being directed to be cemented? I think that this may be done in such cases in which the District Plague Surgeon might consider it to be necessary. In all cases however, the use of *charpoys* would be sufficient to prevent the patients suffering from damp and I believe that this course has been adopted in the Maniktolla Segregation Hospital with a view to prevent any mischief that might arise from the humidity of the soil, as the hospitals there, are located on the grounds of the garden at Manicktolla. If the *charpoys* used there, might prove sufficient safeguards, against dampness, I do not see any reason why their use in private gentlemen's ground-floor *pucca* rooms would not answer the same purpose. Already the people are suffering much from anxiety and other causes on account of the plague, the segregation and inoculation scarces, rumours regarding which, true or false, the masses are ready to catch hold of, it is essential that the authority should use their best endeavours to suit the public convenience, and not to enforce measures that would entail unnecessary expenses on them in the present hard times.

20-6-98. G. C. DHUR.

No. 22. CONCEALMENT OF PLAGUE CASES. 1-7.

SIR,—A correspondent of the *Statesman*, in its issue of the 17th instant, who flourishes himself as a member of the Vigilance Committee, had the audacity to suggest that authority might be given him to enter the Zenana of Indian gentlemen's residences to enable him to examine the inmates thereof! This, of course, seems to me to be what the authorities would not like to concede nor the people would relish the idea of members of Vigilance Committees entering the Zenana with a view to examine the female members thereof, whether they were suffering from plague. Whilst all right-minded persons, not the authorities excepted, are doing their best to conciliate the people, and not to do any act that might wound their feelings in any way, I am not a little surprised that a member of a Vigilance Committee, who must be a Hindu, should come forward, and ask powers, which are liable to be abused at any moment, at the option of those entrusted with them, should they choose to do so. You, Mr. Editor, and all those who know how keen the religious feelings of the Hindus and Mahomedans, who observe the *purdanashin* system, are on the point, must agree with me in thinking that such powers should not be given to any body, even though he be a member of a Vigilance Committee. I believe, that every precaution is being taken by the authorities as well as by the Vigilance Committees not to allow cases of plague to be concealed, I must also be permitted to state that the privilege, wisely accorded to Indian gentlemen to have private hospitals in their houses, has done one good at least, that is, to induce all classes of people not to conceal cases of plague. Can any person be and appliances to treat plague patients in his own house in the same way by his own doctor, as when any member of his family was attacked with other diseases? There can be no fear, therefore, of any case of plague being concealed by the members of respectable families, since they must know that by adopting such a course, they would have much to lose, and nothing to gain. As in the case of respectable gentlemen, so with regard to the masses, The latter will have no need to conceal cases of plague in their houses, as they have been assured that their removal to the Manicklolla Isolation Hospital is no longer necessary, as the several Ward Committees have opened hospitals in their respective wards.

23-6-98. G. C. Dhur.

No. 23. 1-7.

Sir,—The *Calcutta Journal of Medicine*, for May 1898, has an interesting article on the above subject. This journal, I need hardly say, is edited by an Indian medical gentleman of great ability and experience, Dr. Mohendro Lall Sircar. He says that cases of fever, not much unlike the cases, which now come under the category of the plague, were not unknown in this city for years past. Now, then, what is the good of making so much fuss about the plague without obtaining the opinions of other experienced medical men, as to whether Dr. Sircar is right in the opinion, which he has expressed on the subject. If all the *golmal* about the plague has produced any other effect, it has produced one thing which must be regretted. I refer to the scare, which has got hold of the masses, and the people have been leaving the city in such numbers as to denude it of a large portion of the permanent population, for which the authorities are responsible. The notorious Kopalitola case, which created so much noise, occurred some time in the middle of April last. Since then more than two months have elapsed, and we have had only about 136 cases reported, and about 100 deaths. Of these cases, many are said to be suspected cases, and not real cases of plague. Dr. Sircar is of opinion, and those who know him must have respect for his opinions, that the cases of plague are due more to defective drainage than to any other cause. The storm-water, which remains stagnant in the drains for want of sufficient outflow, must create miasma, and damp which would spread over the entire soil such as is calculatad to generate disease and death. I recollect that when the drainage scheme was started by Mr. Clarke, the then Engineer of the Corporation of Calcutta, objection was taken to it by Dr. Mouat, the then Principal of the Medical College, who declared that unless provision was made for a sufficient outlet of water to carry the night-soil of the city, it would stop inside the drains, block the free passage of water, and the result would be the saturation of the sub-soil, which would be followed by pestilence and death. Dr. Mouat wrote several letters, which appeared in the columns of the *Englishman* on the subject, and a discussion of the question in its various aspects led the authorities to appoint a Commission, consisting of Colonel Hyde, the then Mint Master of Calcutta as President, and a few experts as members. This Commission, after a full and careful investigation into the matter, submitted its report to Government, and the drainage and the water-supply, such as we now see covering every lane and by-lane of the city, were sanctioned by the authorities. Dr. Sirkar's idea is not a new one altogether, and the matter is of such vital importance that it should receive the serious attention of the authorities. Now, the question is whether we have a right to expect, whether the plague has or has not made its appearance in the city, that its real cause should be enquired into, not because of the few deaths, but because of the scare which it has created, and is producing such great mischief as we are daily suffering from.

23-6-98. G. C. Dhur.

THE PLAGUE AND THE GRIEVANCES OF THE PEOPLE.

No. 24. 5-7.

Sir,—Now that Calcutta is suffering from a panic, the like of which was not known before, it is time that Sir John Woodburn should take early steps to remove such grievances from which the people are still suffering. His Honor is entitled to our deep gratitude for having granted to us private hospitals in our houses, and removed the inoculation-scare by a single stroke of his Secretary's pen. The people also have had the use of the much dreaded ambulance discontinued and the doors of the Medical College, Mayo, and Campbell Hospitals opened for the treatment of plague patients by the doctors of those hospitals. Now what is needed, is the appointment of a Medical Board to decide what cases, if not plague cases, should not be removed to any public hospital for treatment. I mean those who have been told that they can use a portion of their houses as private hospitals, but who have not had licenses granted to them, should be afforded every facility to use them in the event of the plague breaking out in their families. Dr. Stevens, for aught I know, is a perfect gentleman and is proceeding in such a manner in the examination of the houses of the wards confided to his charge, that he is winning golden opinions. What is now wanted is that the people of all classes, rich and poor, should not be harassed in any way. They have already suffered much from mental agony, on account of the plague. Several of them have already left the city, and proceeded with their families to Chandernagore and other places. The sooner, therefore, they come back the better. It behoves us now to use our best endeavours to reconcile them to the fact that there exists no scare in Calcutta, and that the arrangements, made by the authorities, to conciliate the people are all that is desirable.

2-7-98. G. C. Dhur.

No. 25. SANITATION OF WARD NO. VIII. 5-7.

Sir,—In your local columns, you stated that 150 extra coolies were sanctioned for cleaning the lanes, bye-lanes, and drains of the above ward. This is true, and was done, I hear, at the request of the Assistant Secretary of this ward, and I saw a large number of extra *dhangars* employed on this duty, under the superintendence of an extra East conservancy establishment. Would it not be better if a small number of extra men were engaged, say one dozen, who can help the permanent *dhangars* to keep the roads clean, under the Chaprasi of the Ward, and, were held responsible for the duty. Of course, a few East Indian supervisors might be appointed, to look after the cleanliness of the several wards.

2-7-98. G. C. DHUR.

No. 26. THE PLAGUE RETURNS. 5-7.

SIR,—I find that several of the plague-hospitals opened by the Ward Committees are in a fair working order. Where they have commenced to admit patients, whether suffering from real or suspected plague, into them, and the arrangements, made for their treatment, are admitted to be excellent by Dr. Steven's and other plague practitioners, imported from Bombay, and it must be owned to the credit of the latter, that they are doing their utmost to help the officers in charge of the hospitals by their advice and counsel, such as the dear bought experience which they have obtained in Bombay, Puna, Kurrachi and other places, has taught them in the treatment of such cases. One of the best results achieved by the opening of the Ward Hospitals, has been the virtual closure of the isolation hospital at Manicktollah. Now, there are to be found only two patients in that hospital, one a Christian, named Kenneth Cross, who was admitted there about a month ago, and is still living there. Whether this is a real case of plague or not is questionable. The patient is said to be doing better and is walking about the garden. The other case is that of an old gentleman who was recently admitted. I would beg leave to suggest that a return be published daily in the morning papers, under the signature of Dr. Cook, the Health Officer shewing the number of real and suspected cases.

2-7-98. G. C. DHUR.

No. 27. THE *TIMES* AND THE PLAGUE. 9-7.

SIR,—The *Times* has taken up the subject of the Indian Plague. In an extract which you made in your paper of the 29th June, it says: "There can be no doubt that an impression is spreading both in India and Great Britain, adverse to the extremely rigid methods of segregation, which were at first attempted. The Bombay Government has, after a cheerful consideration, instituted a more elastic system." "The Indian Press," it goes on a little further to say, "continues week after week to protest against the stringency of oppressive measures, which could with difficulty be forced upon a European population, and which are so opposed to the most sacred traditions of Eastern life. * * * *

"Europe understands this perfectly well in regard to Turkey. It realises that to compel the Sultan to apply to his Oriental provinces the same that may with safety be applied in London or Berlin would shake the Ottoman Empire to its foundation." As regards the measures adopted here, the *Times* asks:—"How far is a Government justified in introducing measures at the instance of foreign advisers which can only be enforced at the cost of panic, * * * * I leave the above extracts to speak for themselves. They ought to be written in letters of gold. Both the English Press and the Press here have spoken freely on the measures adopted in this country. It remains to be seen in what light the Indian Government, takes their suggestions.

3-7-98. G. C. DHUR

No. 28. DR. CUNNINGHAM AND THE PLAGUE. 9-7.

SIR,—You have been good enough to publish in your paper of the 30th ultimo a letter from a correspondent, which gives extracts from Dr. Cunningham's work on the epidemic of cholera, which contains the results of his valuable experience, gained in this country by his services under Government for a period of about 31 years, the best portion of which was spent in the study and promulgation of such sanitary reforms as, he thought, were adapted to the climate and circumstances of this country, subject, as it was, to the outbreaks of cholera and other epidemics. I would satisfy myself by giving one or two quotations, which cannot be too often repeated, especially in the present time, suffering, as we are, from the effects of an alleged plague that has ruined Calcutta.

Dr. Cunningham writes :—

In India so far as all experience goes, to impose quarantine or cordons in order to keep out cholera is a proceeding no more logical or effectual than it would be to post a line of sentries to stop the monsoon.

Further on he says :—

"*As quarantine or cordons or both combined have been powerless to arrest the progress of an epidemic, isolation of the sick, disinfection have been equally powerless to arrest an outbreak once it has commenced.*"

An epidemic, whether of cholera, small-pox or bubonic fever, exercises a like influence upon the human system, and, in its virulence, baffles the best efforts of medical skill and ingenuity. Dr. Cunningham's views on epidemics are specially valuable in the present time, and I would, therefore, beg to commend them to the serious attention of the authorities, and, I trust, they will receive the consideration, which they deserve, without the loss of a single moment.

G. C. DHUR.

No. 29. THE PLAGUE. 12-7.

SIR,—I hope, this will be my last letter to you now that the Press, both in this country and England, has spoken out, and the stringency of some of the measures, which were proposed to be adopted in the first instance, has been modified. It is time for consideration whether the Isolation Hospital at Manicktollah should not be closed. The Bombay Doctors, who have had experience of the treatment of plague cases, should be told to act as, consulting physicians in the Medical College Sealdah, Mayo, and the several Ward Hospitals ; and the saving, thus caused, devoed to the improvement of the drainage, which has been found fault with by such experienced medical gentlemen of admitted experience

I would suggest that a return be published daily, showing, (1) the number of old cases, real and suspected, (2) the number of new admissions, (3) the number of deaths, the number of discharges with such remarks as may be necessary to enable the authorities to determine after some time, whether the notification declaring that Calcutta is a plague-stricken city should not be withdrawn, if, by the blessing of Providence it comes to be established that the disease is not of that type as was apprehended.

G. C. DHUR.

No. 30. A SUGGESTION. 15-7.

SIR,—Now that Sir John Woodburn has returned to Calcutta in renovated health, a deputation of the public bodies, *viz*., the Bengal Chamber of Commerce, the British Indian Association, the Trades Association, the Indian Association, and the Mahomedan Literary Association should wait upon His Honor congratulating him for his unceasing efforts in connection with the plague, which have resulted in restoring public confidence. His Honor is said to be visiting the Ward hospitals personally which speaks much for his spirit of self-sacrifice. The policy of reposing confidence in the people at the present crisis has borne good fruit. But one or two things are needed, for which we cannot help troubling His Honor, *viz*., (*a*) the appointment of a Medical Board consisting partly of Presidency Surgeons and Indian Physicians of acknowledged ability, such as Dr. Mohendro Lall Sircar, and partly of distinguished Bombay Doctors such as Dr. Blaney, and others to decide suspected plague cases, (*b*) the closure of the Manicktollah Isolation Hospital, the Medical College, the Campbell and the Mayo Hospitals having opened separate wards for the treatment of plague cases.

9-7-98. G. C. DHUR.

No. 31. EXPIATION FOR THE PLAGUE. 15-7.

SIR,—I have perused with great interest your article on the necessity for some religious rites being performed with a view to avert the danger, with which the plague is threatening us. Not only Hindus, but Mahomedans, Christians, and the various sections of the community ought to unite with one heart, one soul, and pray to the Almighty God for vouchsafing to us His protection in this hour of suffering. Each religious sect might, according to the directions contained in his holy books perform such rites and ceremonies as are calculated to propitiate God. To those who have no rites prescribed in their sacred books, I say, pray fervently, pray till your prayer is heard, knock, knock, and the door shall be opened unto you. God's grace will descend, and we shall all be saved. To the Hindus, I need hardly suggest much. They have already commenced to send out *Sankirtan* parties. They have already commeneed the celebration of the *Raksha Kali Pujah* in some places. Let them now perform a big *homa* ceremony and burn incense and *ghee*. which will have the effect not only of purifying the atmosphere, but the *mantras* that will be uttered on such occasion will propitiate the Deity.

No. 32. THE PLAGUE. 19-7.

Sir,—I thought, I would have no occasion to write again on the above subject. But I find that so long as the plague notification is not withdrawn, I should now and then send you some scraps, such as might appear to be necessary from time to time. You, Sir, are still doing your best, and now and then writing about the plague, and pressing such points upon the consideration of the Government and the people, as are cropping up now and then. But it must be agreed that, in spite of all your efforts, and those of your correspondents, and of the modified, humane policy, adopted by our generous and kind-hearted Lieutenant-Governor, Calcutta has not yet been restored to its former condition, although its inhabitants have commenced to return and are flocking in numbers daily. It will doubtless take some time before we can expect to see our City of Palaces resume its former briskness, whether in trade or in other respects. You and your correspondents have done much to enlighten the authorities on several points, and it must be granted, that Sir John Woodburn has been good enough to concede to us several boons whether of his own accord or by the advice of those around him or in compliance with the suggestions, made by you and your correspondents, for which we cannot be sufficiently thankful to His Honor. What the public wants Sir John to do is, that since His Honor has condescended to visit some of the Ward Hospitals, that he should visit all of them, also the Medical College, the Mayo, and the Campbell Hospitals, where plague patients are treated, and that should His Honor find that any thing is wanting in them, he might suggest improvements, or that should he find that the arrangements there are sufficient to cope with any future contingencies, he might direct the immediate closure of the Manicktollah Isolation Hospital. This is that we earnestly pray for.

17-7-98. G. C. Dhur.

No. 33. PLAGUE DUE TO SINS. 22-7.

Sir,—I know not in what terms to thank you for hunting up an old work, published in the year 1655, from which you gave extracts in your paper of the 10th instant. The writer of the work, you say, is an Englishman, who published it 343 years ago. The book is a very old one it is not strange therefore, that the writer thought and spoke like our *Rishis* of old. He says that the people of Bengal living on both sides of the Ganges, were noted for their abstemiousness and their freedom from sins. They were not subject to visits of pestilence, disease, and death such as we witness periodically. His remarks are, indeed, very opportune at the present moment, and they ought to convey a lesson to our educated countrymen, which they will do well to treasure up in their hearts. Abstemious habits, I can assure yau, Mr. Editor, really go a great way to preserve health, and to promote longevity. This, I can tell you, from personal knowledge and experience. My old father, who lived up to the age of nearly 100 years, was very abstemious. He used to say, that he gave up fish-eating at an early age, and I also gave up fish-eating before of his death, he was not subject to the agonies which attend it, nor did he dread it, as Bacon has it, "Men fear death as children fear to go into the dark." He had simple fever on Tuesday, and died the next day at 8 P. M. in the evening, telling those around him, that he was prepared to pay the debt of nature, and those dear and near to him need not lament, as he had lived very long, and it was high time that he should depart. You must not think it strange Mr. Editor, that he sent for his own physician, a *Kabiraj* and asked him to give him *Mokoredhaj* and *Rashashindu*, as a rigid Hindu must die after taking a dose of that preparation. Now, then, we all know that the wages of sin are disease and death and as you very justly remark the plague, with which we are so much troubled night and day, is due to our sins. Then, I am entirely in accord with you, and I can say without the least hesitation, that this visitatian of Providence is a punishment for our vices in this or in our previous lives, that it is a warning, and that we ought to sufficiently expiate for our sins, and to mend our ways, chastised as we have been, like school-boys, with a rod, so that we might bear in mind the sacred teachings of our Master, and pay heed to the dictates of our conscience, and not to neglect, or disregard them, by doing which we are paying dearly the penalty in mental agony, anxiety, and anguish not only for our own sins but those of our families and children. Let us then make Pujah to propitiate the Deity according to the customs of our various nationalities. Let the Hindu worship his idol, utter the *mantras* which his *Shastras* have taught him, and make *homa* and observe other propitiatory rites. Let the Christian pray in his church. Let the Brahmo pray in his Somaj. Let the Mahomedan utter his prayers in his Musjid. I have no doubt that the united prayers of His children would be heard and we would be freed from the plague by the Almighty Giver of all good and blessings.

12-7-98. G. C. DHUR.

THE PLAGUE AND THE UNDERGROUND DRAINAGE OF CALCUTTA.

No. 34. 23-7.

Sir,—The *Bombay Gazette* has written an able article, in which he attributes the plague to water-logging. The under-ground drainage in Bombay and Calcutta is said to be responsible for the plague which has caused such great mischief in both cities. Now the question which is agitating the public mind is, whether sufficient provision has been made for the free outlet of the sewers, so that no water may be lodged there which may make the soil damp. Those who have had sufficient experience of the influence, to which the prevalence of fever and other diseases in this country is due, are aware that the humidity of the soil in Bengal exerts a great influence in producing pestilence, disease and death. It is against the humidity of the soil that steps must be taken by the authorities and the people with a view to stop the sad havoc, which is now and then caused by the prevalence of fevers in this country. The late Rajah Digambar Mitter declared that the railway and irrigation works prevented the free outlet of water in the interior of Bengal, to which the malarious fever of Burdwan and other places, which devastated certain Districts, was due. He said that, in his conversation with one of the oldest Pundits, he was informed, that the damp, which covered his *puthi*, when kept in his room for some days without being opened and exposed to the sun, was not to be met with before irrigation and railway works were introduced in Bengal. This is an established fact, to which the attention of the authorities cannot be sufficiently drawn. Now, the general complaint is that after a shower the streets of Calcutta become inundated, and it takes some time before the water goes out, to enable passers-by to pass without their ankles and clothes being wet. A committee of experts should be appointed to enquire into and report upon the steps to be taken without the drainage of the city being materially interfered with to prevent such inundation at moderate cost. The sanitation of the town has doubtless been much improved by the introduction of the under-ground drainage and the filtered water-supply. But if the former becomes an agent in sowing the seeds of plague, the sooner the defects, which the experts know best how to remedy, are removed or the under-ground sewers replaced by some other mode of carrying away the excrescences of the town, the better. Unless some body comes forward and puts his shoulders to the wheel to remedy the present state of things, woe betide the citizens. There must be some well-digested plan to proceed upon. We, laymen, can do but little. We can only cry and clamour, and say where the shoe pinches. A Committee of medical men and engineers can alone advise Government in the matter. What we want is that the town may not be saddled with unnecessary costs which it cannot afford to pay. It cannot be denied, that our lives are more valuable than our money. But is not Calcutta already overtaxed, and is it not, therefore, the more necessary that we should proceed with the utmost caution, so that we might not exhaust all available means at our disposal? This is urgently needed, as hundreds of thousands of rupees have already been sunk upon the drainage works, and as at this distant date, the defects in them are being discovered. We must, therefore, be careful not to sink more money in the same works, until we are fully satisfied that money, so spent might not be wasted.

27-7-98. G. C. DHUR.

No. 35. 12-8.

SIR,—Sir John Woodburn has returned to Calcutta. Before he proceeded on tour, His Honor visited some of the Ward hospitals, and opened personally the plague hospital of Ward No. IX. He said, he was perfectly satisfied with their arragements. Elsewhere he is also said to have expressed a hope that he would soon be in a position to say good-bye to the plague, judging from the state of the country, and the reduction in the number of plague cases in the Metropolis, there having been no cases of plague successively for five days which, indeed, was a very satisfactory and hopeful sign of the times. On Saturday morning, His Honor visited the plague ward of the Medical College Hospital, and I have no doubt that he was satisfied with the arrangements for the treatment of the plague patients who received every care and attention from the hospital authorities. According to the Venice Convention if there were no cases of plague consecutively for ten days, the plague regulations should cease to have force. Sir John Woodburn had every reason, therefore, to be hopeful when he found that there were no cases of plague for five consecutive days in Calcutta. But since then things have taken a quite different turn, though they have not gone from bad to worse, as there have been a few cases of plague only; thank God that they have not been numerous, and it must be admitted that there is still some remnant of the disease here, and that, therefore, Sir John Woodburn in dealing with the matter has no other alternative left than to proceed with the utmost caution. This, indeed, is not a very bad state of things, such as some people are led to imagine, and it should not therefore dishearten His Honor, and those who think that the sooner the plague regulations are withdrawn, the better. We all know that Sir John Woodburn as the head of the Local Government is responsible for the administration. We also know that Dr. Dyson, the Sanitary Commissioner of Bengal, is the constituted medical adviser of the Local Government in such matters as those concerning the steps to be taken during the prevalence of epidemics in and around the Province. I would, therefore take the liberty to submit for the consideration of His Honor as well as of Dr. Dyson, whether the time has not arrived to remove the yoke under which the inhabitants of this city have been groaning for some time, under circumstances over which no body has any control. Of course, it must be admitted from the experience already gained that the number of plague cases is becoming less every day. On the 7th instant, there were two fresh admissions and one death, and up to that date there were only 201 cases of plague and 162 deaths. It is some three months and twenty-four days during which the plague has been prevailing here, giving an average of less than two cases daily. Under such circumstances, I think, there could be no harm if His Honor the Lieutenant Governor were, in the exercise of the discretion vested in him, to direct that the plague regulations might cease to have force temporarily, and that such cases of plague as might occur, might be treated, in the meanwhile, in the plague wards of the Medical College, the Mayo and Campbell Hospitals where sufficient accommodation has already been provided for their lodgment, and comfort, and all the conveniences which human ingenuity can suggest for the relief of human suffering. The Health Officer and a few Bengali plague doctors may be left to exercise such supervision as the authorities might think fit.

9-8-98. G. C. DHUR.

The net proceeds from the sale of this treatise—after defraying the cost of printing and publishing—are to be contributed to THE INDIAN FAMINE FUND.

THE PREVENTION OF
EPIDEMIC ZYMOTIC DISEASES
IN INDIA
AND THE TROPICS GENERALLY.

An Indictment of the Government and its Medical Advisers, and an Appeal to the People of India and of Greater Britain for the Formation of an Association to carry into effect the object of this Treatise.

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STREET, E.C.

1901

DEDICATED,
IN FULL SYMPATHY WITH THEIR SAD FATE,
TO THE
POOR PEOPLE OF INDIA,
WHO ARE CONSIGNED TO DIE OF HUNGER AND STARVATION
WITH ABUNDANCE OF FOOD WITHIN REACH,
WHILE MILLIONS ARE SPENT ON A NEEDLESS AND
BARBAROUS WAR,
WHICH IS DEGRADING IN THE HIGHEST DEGREE
TO A NATION
THAT PRIDES ITSELF ON BEING THE REPRESENTATIVE OF
FREEDOM AND CIVILISATION.

"Do not act as if you had ten thousand years to throw away. Death stands at your elbow. Be good for something while you live, and it is in your power." —*Marcus Aurelius.*

"Is not the world full enough of riddles already without our making riddles also out of the simplest phenomena?" —*Goethe.*

"It is the duty of every one who regards a doctrine as true and important, to do what he can towards diffusing it, leaving the result to be what it may." —*Herbert Spencer.*

"Only by varied iteration can alien conceptions be forced on reluctant minds." *Herbert Spencer.*

PREFACE.

GUIDED by the habitual and generally-prevailing custom of submitting all questions about the physical well-being of our body to the so-called "*experts*"—*i.e.*, medical men, the reader will most probably consider the subject of this dissertation as beyond his "ken," and thus acknowledge himself not only as imperfectly instructed, but also as indifferent to one of the most momentous questions, which can engage the human mind.

He may become aware of his deficient education when he learns, that the physician's general knowledge of the human body is helpless without the assistance of the special knowledge, which the patient can—and he only and nobody else can—and should have of his own body; and he may awaken from his apathy towards the hundreds of thousands of human beings, who perish from preventable diseases, when he is informed, that the doctor stands powerless (except as a nurse) at the bedside of the sufferer from Plague or Cholera, as well as in the case of many other forms of disease—enteric fever among our soldiers in South Africa to wit.

With this admitted failure in the prevention and cure of such maladies, and the prospect of not only preventing suffering and premature death, but also of assisting the conquest of the tropics by the white man —the reader may feel induced to aid and promote the object for which this dissertation was written, and step out of that bondage of submission to professional authority, which has been designated by a popular writer as "*Cowardice.*"

The "*Critic*"—if he can do no more than glance over the contents of this treatise, and only repeat or judge a promiscuous sentence—should act honestly by leaving it alone.

C. G. G.

Beckenham, January, 1901.

THE PREVENTION OF

EPIDEMIC ZYMOTIC DISEASES

IN INDIA AND THE TROPICS GENERALLY.

I.

THE inhabitants of India have for ages, no doubt, suffered from, and have been decimated by epidemic diseases in an alarming degree; and so long as medical science was in ignorance of the cause and the nature of those disorders, and especially of the human organism in relation to them, we must accept this destruction of life as the inevitable result of such ignorance.

Now, however, since the medical profession asserts that the progress in the sciences of *Physiology* and *Pathology*[1] enables its votaries to have obtained a deeper and more correct insight into the phenomena of the particular class of diseases, and to give a truer explanation of the symptoms by means of a profounder knowledge of the physiological conditions upon which the health of the human body depends, we are justified to ask: *How far has medical science taken advantage of this increased knowledge for the pursuit of the great and paramount object—the saving of human life and the prevention of human suffering?*

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[1] I do not mention *Medicine*, for the very simple reason that, notwithstanding the assertions to the contrary, the great achievements in the above-named branches of human knowledge do not always (*i.e.*, in the majority of cases) include a concomitant progress in the science and art of Medicine (*i.e.*, in the actual *Healing* and *Curing of Diseases*).

To answer this question by enumerating the many bacteriological researches and discoveries, or by pointing to the elaboration of a more distinct and improved "Nosology"—that is, a refined art of giving Greek or Latin names to symptoms, or to a class of symptoms, or to certain forms of disease—this is evading the question; it does not inform us what progress has been made in the beneficial results of medical art; it does not show to what an extent, if at all, the physician can exercise his skill with greater certainty in preventing and curing these diseases, than he was able to do, say, fifty years ago.

Let us but direct our inquiry to the two epidemic diseases, which at the present time decimate the Indian people—namely, *Cholera and Plague*. In relation to the former—Cholera—it can safely be asserted that the physician (or the surgeon-field-marshal) stands as helpless at the sufferer's bedside now, as did the doctor in 1817, when that disease for the first time claimed the attention of the profession. Although the disorder has now been *studied* for eighty years, yet this scourge ravages, in this year of grace 1901, those districts of India, where the famine has weakened the powers of resistance against the disease among the famished and starving people, thus plainly indicating, that not the Cholera-bacillus, but an *increased susceptibility* (through want of food) is the cause of the present epidemic; and the only means, For more than seven years has Professor Haffkine experimented now to prove (or, more correctly, to discover) that the injection of a prepared disease-serum protects against an attack of Cholera; and, although voices have been, and are raised among the unbiased members of the faculty against the unhesitating acceptance of the favourable conclusions upon "*insufficient and uncertain data*," the Professor, as also his supporters and friends, proclaims the results as "*almost*" incontestable.

And what has been achieved in these seven years of experimenting? How far do the results of Professor Haffkine's researches encourage the Authorities and the Profession to recommend "Universal Inoculation"?

Before answering that question, it is necessary to point out that inquiries have ascertained the well-attested fact, that in Central and Western Europe not more than five per cent. at most of the population show any susceptibility for cholera. In Moscow, in 1831, only 3 per cent., and in Hamburg, in 1892, of every thousand people (*who all drank the Elbe water by which the disease was disseminated*) only 28 were attacked, and of these 13 died; therefore less than 3 per cent. were susceptible, and less than 1½ per cent. succumbed. In Srinagar (Kashmir)—one of the most unsanitary places on the face of the earth, and hence highly favourable for the development of zymotic diseases—these figures come out per thousand inhabitants as 72 and 46—*i.e.*, 7.2 per cent. of the people were attacked, and 4.6 per cent. died.[1]

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[1] See: *On the Natural Immunity against Cholera.* (London: Williams & Norgate; 1894). Also: *Common Salt: Its Necessity for the Prevention of Disease.* (London: Sonnenschein & Co.; 1898 chapter xxxviii.) And: *Dr. Bisset Hawkins's History of the Epidemic Cholera in Russia.* (London: 1831; p. 106.)

In the face of such undoubted facts we may well exclaim: One might pale before a science, which proposes to apply such means (inoculation) to 100 people—that three, or, let us say, even seven, of them, may be saved from an attack of the disease, and half of them from an untimely death; especially so since *a second inoculation is deemed necessary to deprive the first of its life-endangering character.*

In an article on "Vaccination against Cholera," in the *Fortnightly Review* for March, 1893, Professor Haffkine records his researches and experiments on this subject, and states therein:—

> "The wound of which I have spoken"—as the result of the first vaccination—"*is absolutely horrifying to look at, and in all probability extremely painful.* Moreover, although of itself it does not present any danger to the health of the individual inoculated" (?) "it exposes him to all the complications inseparable from open wounds such as erysipelas, gangrenous suppuration, etc. The point was to discover a new vaccine, which would protect the organism against the violent local re-action, and this could manifestly only be a modified culture of the microbe"; hence "two successive vaccinations are necessary."[1]

Well may the *Calcutta Journal of Medicine* (September, 1896) remark that "Dr. Sircar gives a searching examination of the results reported from Dr. Haffkine's inoculation for cholera, and comes to the conclusion, that the method is useless and dangerous." In this opinion he is supported by many medical men, who carefully weigh the evidence and hesitate to extol the serum treatment before a trusting public on doubtful—if not imaginary—statistics.

How far the whole proceeding deserves our confidence can be ascertained from a late "Official

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[1] The word "Vaccination" is derived from the Latin "Vacca," a cow. It is not quite clear where the cow comes in, or who is the cow, in the "serum treatment" for Cholera or Plague??

Correspondence," dealt with in an article which appeared in the *Times* of 17th August, 1900, entitled "Inoculation against Cholera and Typhoid." It is there stated that Dr.—or more correctly Surgeon-Captain—Vaughan reported as follows :—

> "The operation of protective inoculation was at first done in two stages—*i.e.*, the inoculation with, what used to be termed the *first vaccine* to begin with, and later on inoculation with the *second vaccine*. For various reasons this was found to work inconveniently in practice"—(therefore "*inconvenience*" and not science determined the change)—"and as it came to be ascertained, that it was quite practicable to omit the inoculation with the first vaccine, the operation is now limited to the inoculation with the second vaccine only."

This deserves to be recorded as a wonderful scientific achievement. No. 1 Vaccine was discovered to protect against cholera, but is dangerous ; to make it harmless No. 2 Vaccine is invented, to be used after No. 1. Next it is found that No. 1 is inconvenient, and it is made practicable to discard it and obtain the same result with No. 2 Vaccine only. We are justified to entertain the hope that these discoveries will be crowned by making it "practicable" to leave out "conveniently" No. 2 Vaccine also, and yet protect the inoculated.

We cannot be surprised that Captain Vaughan enthusiastically declares as the result (*after seven years of experimenting*) :

"It APPEARS that *the impression has gradually gained ground that the inoculated* ARE NOT NEARLY SO LIABLE TO BE ATTACKED *as the uninoculated*."

(The mountain was in labour, and has brought forth a mouse !)

But our admiration has not reached its limit yet. The *Times*' article proceeds :—

> "The table of results shows, as Dr. Vaughan points out, that there is not only a reduction in the incidence of cholera among the inoculated, but that, after inoculations have been done in any community, the incidence and death-rate among the *un*-inoculated are *apparently* also reduced."

This is a kind of logical "*salto mortale*," which imposes upon the ignorant and unreasoning public. It would be ludicrous, were not human life at stake. Such loose and illogical assertions would not be offered for our acceptance, except under the conviction of the thoughtlessness and stupidity of even the greater portion of the so-called educated public.

Equally injudicious is the attempt to take credit for the course of an epidemic by the application of such questionable means, when the disease dies out of its own accord—without any medical or sanitary interference. And this is not only the case with cholera, but also with plague (about which more immediately), with small-pox and all zymotic diseases. Dr. Nelson very pithily remarks: "When a large town was attacked, it would take from two to three months to select all the susceptible, and then cease.")[1]

When in Hamburg or in Srinagar the cholera disappeared, the Municipality and the Medical Officers cannot boast of having been instrumental in stamping out the epidemic—any more than the Chinese authorities can claim to have stamped out the plague in filthy Canton, where the pest ceased synchronously with its disappearance in Hong-Kong, in which latter island all known and every possible means were employed to suppress the epidemic. "The decline of the epidemic cholera in Srinagar was due not to any absence of filth and of cholera-poison, but simply to the fact that the disease had weeded out all the persons who were susceptible to it."

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[1] *Asiatic Cholera*, by R. Nelson, M.D., Health Officer, New York; 1866.

The questionable character of so-called vaccination (or *serum-injection* of any kind) is glaringly forced upon us, when we inquire into the *rationale* of such a procedure, and find that the process is based upon the assumption, that one attack of the disease (whether it originated through a natural infection or through the injection of the diseased germ) confers immunity against a second attack.

Surely, medical men who subscribe to, or act upon such an assumption, cannot possibly be ignorant of the fact, that the same person can be suffering twice or three times from the disorder during one epidemic. As Dr. Wall remarks :—

> "A patient will have cholera and completely recover, and resume his ordinary mode of life. In a short time—it may be, for instance, a fortnight or three weeks afterwards—a re-infection having occurred, he will go through the whole course of the disease again in the usual way. This has been known to occur three times. It would appear improbable that any mode of inoculation would confer an immunity which cannot be conferred by the disease itself. Dr. Haffkine argues it would ; but it must rest with him to show how a condition produced by an artificial culture can surpass in protective power an attack of the natural disease."[1]

The word "*inoculation*" is a deceiving misnomer, since the process involved is the injection of a serum in often considerable quantity ; so different from the inoculation of the vaccine- or variola-virus, of the minutest germ on the point of a needle or a lancet against small-pox. To advise and employ this injection of an anti-toxin serum against cholera is dictated by a complete misconception of the nature of the disease (see *Immunity against Cholera*); it is wanting in logic and common sense, and, considering the danger to health and life accompanying the operation—which is, with a great deal of levity, superciliously denied—it appears highly reprehensible, if not criminal.

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[1] Dr. A. J. Wall, *Asiatic Cholera ;* London, 1893, p. 94.

THE last sentence gains in strength when we bear in mind that a simple prophylactic remedy exists, which has not only a scientific basis for its application, but has already proved itself effective as a curative agent against cholera. It furthermore is everywhere accessible, is easily applied, and is of a nature to meet with acceptance and approval on the part of the general public.

In Hamburg in 1892—after all other means, which had been tried against cholera, had failed—it was found that the only remedy left, by which the disease could be beneficially influenced and the sufferer's life could be saved, was *the injection into the circulation of a solution of common salt.* An addition of sodium-sulphate, as recommended by Professor Hayem of Paris, gave no better results, and was soon discontinued. Also other medicinal additions were tried, such as Thymol, Peroxide of hydrogen, etc., without being more effective, and hence were also discontinued.[1]

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[1] Dr. C. Sick, *Die Behandlung der Cholera mit intravenöser Kochsalz infusion.* Also Dr. G. Hager, *Die Infusions-therapie der Cholera, behandelt nach* 967 *Fällen.*

The simple salt-solution alone had a wonderful effect in restoring vitality to the dying patient, and repeated injections achieved complete recovery in most cases; "we felt at least"—as Dr. Sick remarks —"that we did not stand helpless at the bedside."

That it did not wrest all sufferers from the claws of death will be explained immediately by the fact, that in some cases—which were taken into treatment too late, and in which the destruction of the blood had gone too far—it was absolutely impossible, by any available means, to restore life.

How common salt proved itself so beneficial in the case of cholera, can be understood from the following analysis of the symptoms presented by that malady.

All latest researches lead us to infer that death in the case of cholera is not caused by the loss of water from the blood, nor is it the result of the pathogenic poison acting on the nervous system. It is self-evident that, in so complicated an organism as the human body, one part of it cannot suffer without the other parts becoming at the same time more or less involved, and responding in sympathy. When, however, the chief symptoms, which are characteristic of cholera, are closely investigated, it will appear beyond doubt that this disease has its special seat in the blood; that it endangers the life of the sufferer through the more or less extensive destruction of the red blood-corpuscles; and that this latter is the true cause of the fatal issue. With the destruction of the red corpuscles, the blood has lost its physiological function of absorbing oxygen in the lungs, and giving it off to the various tissues; in consequence of which: weakness of the heart, stagnation of the circulation, lowering of the body's temperature, cessation of the metamorphosis of matter, arrest in the secretion of the kidneys, with other morbid symptoms, such as difficulty of breathing, a feeling of suffocation, cyanosis (blue-skin), etc., are the result; and the sufferer, often with full consciousness, finds his life ebbing away, until death ends the scene.

Already in 1831 Drs. Russell and Barry reported: "The blood ceases to circulate, its physical properties are altered......the secretions are all arrested, and animal heat is no longer produced"—as the result of the blood's incapacity of absorbing oxygen. (See *Common Salt*, pp. 67 to 76). Dr. Bisset Hawkins remarks (p. 62):—

> "A frequent variety, the worst of all, is that which is noted for the very slight commotion in the system, in which there is no vomiting, hardly any purging, perhaps only one or two loose stools, no perceptible spasms, no pain of any kind; *a mortal coldness, with arrest of the circulation, comes on from the beginning, and the patient dies without a struggle.*"

Dr. Hartley Kennedy (*Notes on Epidemic Cholera*; London, 1846), who has had an extensive experience in India, states:—

> "It is more than probable, however, that these"—diarrhœa and vomiting—"are merely the *first perceptible symptoms*; for it would appear that *a great change has already taken place in the circulatory system, and that the action of the heart itself has been greatly diminished before they occur.*"

And the action of the heart, and with it the circulation of the blood, as also the activity of the nervous system—in fact, *life itself—depends for its continuance during every moment of our existence on the supply of oxygen; and if the blood is incapable of taking it up in the lungs and feed the heart and the nervous system with it, then the organic mechanism will come to a standstill, and death is the inevitable result.*

Clinical (bedside) and *post-mortem* examinations have shown that "*the destruction of the blood-corpuscles is the pathognomonic lesion of Cholera*" (Dr. Mireur, *Etude sur la Prophylaxie et le Traitement du Cholera;* Paris, 1884). It is the never-failing symptom, which is characteristic of the disease in its fatal issue.

With the object, therefore, of preventing and curing cholera, our attention should be principally directed to the protection of the blood against the pathogenic influences; and this will be still more impressed upon our mind when we take into account that over 90 per cent. of human beings are already protected through a natural immunity.

It is a singular phenomenon, and not to the credit of medical acumen, that the efforts of the profession for the protection of the human body have been directed to all extra-corporeal influences and agencies (with the exception of the fictitious protection by means of serum-injection), and never to the inquiry into this "*Natural Immunity.*" All "*studies*" and investigations of the nature of the disease resolved themselves into the discovery and the hunt for the bacillus; to ascertain its mode of propagation, its vitality—in short, its natural history; and whenever the question of climate, as a favourable factor for the development of the disease, has been raised, it has always been referred to in its influence upon the bacillus, but never was attention directed to the effect of climatic conditions—*i.e.*, of heat and moisture—upon the susceptibility of the human organism for the disease. How true is Dr. Gottstein's remark (in *Allgemeine Epidemiologie*) about the disregard shown to human susceptibility, when he says :—

> "We estimate the morbid symptoms in an animal body by the virulence of the bacillus, while at the same time we measure the

virulence of the bacillus by the morbid symptoms of the diseased organism."

The whole question of the Prevention and the Treatment of Cholera—as represented and taught by medical science and medical art—has hence not met with anything like a satisfactory solution, and thus justifies an appeal to the people of India and to the public generally, to press for the application of more promising measures other than those, hitherto employed by the Indian Government and its medical advisers.

III.

Before entering upon the consideration of the measures to be adopted against cholera, it will not be out of place here to survey the combat with the other form of disease, the Plague, and learn what has been achieved by the attempts of "stamping out" that epidemic.

Since September, 1896, has the bubonic plague been raging in India, and has defied all efforts of the doctors and the Government. In the Bombay Presidency alone the victims of the scourge can be counted by considerably over 100,000, and the means employed to combat the epidemic have proved futile, while throwing a heavy financial burden upon the Indian Government and upon the various Municipalities.

The earnest endeavours of checking the spread of the disorder by separating the "attacked" (in special hospitals) and the "suspected" (in segregation camps) from the still "unaffected" have had, no doubt, some influence upon the expansion of the epidemic within narrow and circumscribed areas; but, on the whole, it has not produced any signal effect in either confining the disease to the infected regions, much less in stamping out the epidemic. The plague has mocked all the measures, which have been adopted against it. It reappears year after year to demand its victims; it invades distant as well as neighbouring countries, and raises its "Hydra-head" in different parts of the earth in a most unexpected manner. But wherever it appears there the doctors arrive in great numbers to *study* the malady—some, according to the author of *The True Aim of Preventive Medicine* (*Contemporary Review*, October, 1900), to sell their wares: the latest concocted antitoxins. The result is as of old: the susceptible, when exposed to the infection, are attacked, and either recover or die, according as their constitution and their vital powers serve them to conquer the disease; or fail them, and they succumb. The doctors are helpless to save the life of the patient, if his own recuperative powers cannot do it. We must admire Dr. Choksy's honest admission that "all that the means at our command can do is simply to tide the patient over the most critical period, and to assist nature in recovering her original sway over the system."

As in the case of cholera, so it is in plague: the greater number of people show a natural immunity against the disease; and this immunity is the potent safeguard to escape an attack. There are human beings who carry the plague-poison about with them, without suffering or yielding to the infection. Others, again, when the poison enters their system, suffer only a slight indisposition, scarcely enough to disturb them in their daily avocation; while the susceptible members of the infected community are struck down, and if death does not claim them, then often the patient lingers under the affliction of serious constitutional ailments.

How powerfully this *in*-susceptibility asserts itself for the protection against plague is evidenced by the facts, which are related in the Report of the Austrian Plague Commission; and in reading that report we shall receive besides a striking answer to the opinion, so frequently and thoughtlessly expressed, that bodily cleanliness affords protection against infection.

The late Dr. Müller informs us in that report "that the medical men in Bombay practically escaped; which," he declares, "cannot cause surprise when it is remembered, that constant care was bestowed on cleanliness and disinfection."

The assumed cause of this immunity is, however, completely controverted by his own description of the scenes in the Arthur Road Hospital, which, for its undoubted importance, deserves so be reproduced uncurtailed. He says:—

> "It must be considered as most remarkable that the 'ward-boys' and the 'sweepers' in the hospital were immume from the plague, although the former had to attend the sick, change bandages, and, during this process, touched the open buboes; while the latter were engaged in the removal of fecal and other deposits, cleaning the floor and the utensils, transporting the dead, and assisting in the operations on the corpses. Only one was subject to an attack previous to our arrival, but he recovered; and during our stay in Bombay two ward-boys sickened, but were able after a few days to resume work.
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> "The ward-boys and the sweepers went about *barefooted*, sometimes with bleeding cracks in their feet, and often showed rends in their fingers. One sweeper moved about the wards with a deep wound in the sole of his foot, and the boots which we bought for him he only wore half a day, to save them. It will be more than remarkable to learn that these incredibly dirty sweepers cleaned the utensils which contained the sputum, urine, and faeces with their bare, wounded

fingers, and walked about with naked feet on the floor, which was constantly soiled through the sputum and the evacuations, dropped by delirious and other patients—*and yet they escaped infection.*

"Moreover—with the object of allaying suspicion—the relatives and friends were permitted to remain constantly at the bedside of the sufferers. For whole days a family of adults and children would squat round the bed, not to lose a moment in removing the corpse to a place of cremation. I (Dr. Müller) have seen numerous cases in which relatives and friends have repeatedly touched the bubo or carbuncle without washing their hands previous to leaving; how, in the case of pneumonic plague, the friends and visitors have wiped away with their fingers the bloody sputum (which is, in truth, a pure culture of the plague-bacillus) from the mouth of the sufferer; or, to save the patient the painful exertion of turning over, have received the expectoration in their hand. The hand would then be wiped either on the floor or on their dress. Never have I seen these people wash their hands, and, without any attempt at cleanliness, they would take their food with their dirty fingers. And yet, according to the official report of the Arthur Road Hospital, not one of these barefooted visitors to the bedside of these plague patients has been attacked by the disease."

This mocks all medical science; and it may very pertinently be asked: Of what value are sanitation and serum-injection in the face of such experiences?

Dr. Müller adds: "To come to any conclusion from the escape of people, who are so intimately and so directly exposed to infection, is almost impossible." And, let me add, it is equally almost impossible not to see in these facts the evident proof, that the principal factor for the development of the individual case and for the propagation of an infectious disease, is the individual susceptibility, the predisposition for the disorder; in other words, that *a natural immunity is the most effective weapon in the combat with an epidemic.*

And Dr. Müller expresses the same view when he says: "Whether the organism will triumph over the disease depends upon the degree of its natural power of resistance to the plague-poison."

Arnott, M.D. (in his article "On the Plague"): "In those persons in whom the '*vis medicatrix naturæ*'—the resistance of the tissues to the microbe—is sufficient, the bacillus is arrested and destroyed in the glands."

IV.

THE last remarks lead us naturally to the inquiry about those symptoms of the disease, which indicate the more or less serious character of an attack, and enable us to predict or estimate the chance of a fatal issue. Here we shall find, as in the case of cholera, that the *mortal* symptom is the destruction of the blood, and, as the immediate result, great weakness of the heart.

Considering all the symptoms presented to us in a case of plague, it must appear evident, that the bubonic swellings are in themselves not contributive to the fatal issue. Says Dr. Milroy: "During an epidemic many persons have often been affected with glandular swellings and pains, and occasionally also with carbuncles, but with so little febrile disturbances, that they have been able to follow their occupation, and have speedily got well." The members of the Austrian Commission suffered from lymphatic enlargements, without any other morbid symptom; their blood possessed sufficient vitality to resist the plague-poison. And that the entrance of the bacillus into the blood, and with it the destruction of the corpuscles, imparts to the case the fatal character, is fully confirmed by the report of the German Plague Commission, which states that, WITH THE ENTRANCE OF THE BACILLUS INTO THE BLOOD-CIRCULATION, AND ITS

EFFECT ON THE RED CORPUSCLES, THE WHOLE CLINICAL ASPECT OF THE CASE, HITHERTO OF A MILD AND BENIGN CHARACTER, REVEALS SUDDENLY SERIOUS AND ALARMING SYMPTOMS—COPIOUS DIARRHŒA INDICATES THE APPROACHING DEATH.

Without resorting to a bacteriological investigation of the patient's blood, but limiting our observation to the ominous symptoms forced upon our attention, we must come to the conclusion that the blood has ceased in its function of supplying oxygen to the system; and "*deficiency of oxygen in the blood is gradual death to the heart.*"

Is the blood of a plague patient capable of absorbing oxygen, even if this latter were offered in an undiluted, pure state? All evidences distinctly indicate that this is not the case. As a result, the heart, for want of the necessary stimulus, beats quick, soft, and feeble; the circulation becomes languid, and the nervous system shows the symptoms of a waning life.

A most striking confirmation of this is found in all the reports from bedside observations; they one and all point to "*the weakness of the heart*" as the immediate cause of death, and Dr. Müller, in the Report of the Austrian Commission (as also in a posthumous work on the Plague; Vienna, 1900), dwells with special emphasis on this phenomenon. He says: "In not any of the known infectious diseases are the symptoms, connected with the heart, forced upon our attention in the same degree, as in the case of plague. The state of the heart dominates the course of the attack. THE PATIENT PERISHES FROM WEAKNESS OF THE HEART."

weakness is supported by Dr. Müller's observation, that "the remarkable increase in the frequency of breathing is typical in all cases, even in those which end in recovery. The increase in the frequency of breathing is generally dependent upon the weakness of the heart, much less upon the height of the fever."

In fact, difficulty of breathing and weakness of the heart are both the consequence of the incapacity of the blood to absorb the oxygen from the atmosphere in the lungs. And Dr. Müller further believes, that even the nervous system has less influence on the course of an attack than the state of the heart. "I have," he says, "seen a number of cases, which developed rapidly, with freedom from, or only slight nervous ailments, and ended in death; while others, with severe disturbances of the nervous system—even with delirium—recovered."

The German report throws doubt upon the weakness of the heart as a cause of death, for the reason that necroscopic (*post-mortem*) evidence proved in several instances that the heart was anatomically sound. Just so. However sound the heart may be, its insufficient power to propel the blood into the arteries can be fully explained by the want of oxygen in the blood to stimulate the nerve-centres of the heart; and it is hence more than probable, that the true cause of death must be looked for, not in the weakness in the heart, but in the destruction of the red-blood corpuscles. We can find evidence in support of this view in most treatises on the plague, such as the red discolouration of the serum, which is a positive indication of the dissolution of the red corpuscles, mentioned by various authorities (see Dr. Müller, "*Die Pest*"). There are other symptoms which to describe would be out of place here; but we cannot be guilty, I venture to think, of going beyond the bounds of simple logic, when we maintain, that all indications—whether bedside experience or necroscopic evidence—point to the fact, that the cause of a fatal issue in an attack of plague is fully accounted for by the destruction of the blood corpuscles and the consequent deficient oxygenation of the blood; and that hence any remedy, either prophylactic or curative, must have for its object the protection of the blood corpuscles against the pathogenic microbes.

V.

It has already been referred to above that the plague is, by some "authorities," declared to be a disease, which finds its home only where filth and dirt accumulate; where unventilated dwellings, with overcrowded inhabitants, prevent a free and efficient supply of fresh air. What a cruel reflection this thoughtless and superficial assertion has cast upon those persons and families who, with all proper precaution and scrupulous cleanliness, have been attacked, and some of them have had to suuccmb to the disease.

Medical science, when supporting and maintaining so shallow a view of the cause of plague, lowers itself to the understanding of the every-day person (of the man in the street), to whose mental capacity "dirt" is a tangible and positive explanation of the phenomenon in question; and it is not to its credit, that such a view should be seriously brought forward as science, since all facts show it to be without strict scientific foundation.

The members of the Austrian Commission, with all their "care for cleanliness and disinfection," nevertheless suffered from a mild attack; and one of them had to go into hospital with severe symptoms of the disease. So also a member of the German Commission; both, however, soon recovered. The history of the outbreak of the epidemic in Bombay reports, that at the commencement, in a very short time, about one hundred persons had succumbed—"singularly enough, mostly members of wealthy families," therefore, we may conclude, well-nourished, and living in open and well-ventilated dwellings.

A most striking instance to prove, that fresh air and detached habitations on rocky ground do not prevent the plague, is furnished by the epidemic in Kamaun, situate in an open valley in the hill district, about 6,000 to 7,000 feet above the level of the sea, and hence, under very favourable conditions for freedom from epidemics. The houses stand detached at some distance from each other. "The families affected were comparatively well-to-do people, and poverty and destitution had nothing to do with the outbreak. The site and natural surroundings of the dwellings are exceedingly healthy; and the families undoubtedly lived in a naturally and exceptionally bracing climate." (See Dr. Planck's report, cited by the German Commission.)

If, therefore, poverty and crowded, bad-ventilated habitations—*i.e.*, bad food and bad air—cause the epidemic outbreak of plague, there should be no plague in the hill districts; whereas, the fact is the disease exists there *permanently*, under the name of *Mahamari*.

Another instance is afforded by the Europeans, who were not exempted from an attack of the disease, although they lived at a considerable elevation on the island of Hong-Kong.

"How little direct connection exists between the local geographical and climatic conditions and the outbreak and the spread of the plague is shown by the fact that the disease is endemic in the lowlands of Egypt, as well as in the high plateau of Arabia (Assir); in the marshy lands of Babylon and the close banana-groves of Uganda in Central Africa, as well as in the clear air and the dry, rocky grounds of the Alpine villages in the Himalayas." ("*Die Pest.*")

We can but smile—in face of the above facts—at the persistence with, which the assertion is pressed upon our attention at scientific meetings, and in an "enlightened" public press, that plague cholera and allied diseases, find their only favourable conditions for an epidemic development in low-lying, swampy, and porous soils.

The various phases of our subject, which we have considered so far, must inevitably lead us to the conclusion, that the chief factor for the development of the individual case of plague, as well as for the epidemic spread of the latter, is *the susceptibility of the human body for the disorder;* and how this susceptibility is influenced by the surrounding climatic conditions, and by the habits of the individual, we shall now endeavour to ascertain.

VI.

In order that we may obtain an insight into the nature of the susceptibility for infectious diseases, and to understand how such a susceptibility can be developed, increased, or, on the other hand, be conquered through personal habits or climatic conditions, it is necessary, that we should inquire into the action of plain water on the human body. Here it will probably cause surprise, if not astonishment, when I state that plain—in popular language, *innocent*—water exercises a *destructive influence* upon the living tissues of our organism.

When the physiologist wishes to *kill* the blood—*i.e.*, to dissolve the blood-cells[1]—(with the view of obtaining blood-crystals), he simply adds some pure water to the blood; the cells—which, in their normal healthy condition, are of a disc form—absorb the water or watery serum, swell, and assume a spherical shape (designated by Professor Klebs as the *death-form*). If still more water is added, then these spherical cells burst; the red colouring matter (the hæmo-globin) diffuses in the serum (the blood-liquor), which causes the blood to assume a dark violet colour, and to become more liquid (less viscid). When this process occurs in the human body, then this red-stained serum appears in the urine and permeates the tissues; and if such a destruction takes place more or less extensive, then disease in one form or another—if not death—is the result.

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[1] Blood-cells, blood-corpuscles, blood-globules, and blood-discs are synonymous terms, and refer to the red corpuscles, unless otherwise stated.

This destructive tendency of plain water does, however, not display itself only in the blood, but also in the muscular tissues. The quantity of water contained in the muscles has been the subject of inquiry, and its great amount has been considered to be the cause of an increased susceptibility for a certain class of diseases. In an article on cholera, Professor Max von Pettenkofer is, I believe, the first who pointed out this fact: That those, most liable to the disease, are distinguished by an increased amount of water in their muscular tissues. And "Professor Ranke informs us that *tetanus is always connected with* a considerable proportional loss of solid matter in the muscular tissue, which is the result of *an augmentation of water*."

Dr. G. Jaeger, whose name is so well-known in connection with woollen underclothing, made experiments, extending over several years, to prove, that *a high specific gravity of the body* (obtained by extracting water from the system) *imparts a corresponding power of resisting disease.* The same detrimental effect of plain water has been witnessed in the nervous tissue. According to Professor Buhl's researches, the highly dangerous nervous disease, called *meningitis*, is always accompanied by the presence of an abnormal quantity of water in the nervous matter.

A remarkable instance of the deleterious effect of plain water on nervous sensibility is the following, which every one can experience for himself: "Weber has proved, by experiment, that, when the tongue has been immersed for one half to one minute in plain water of a temperature a little over blood-heat, it has lost its capacity of tasting sugar."

Generally, then, *plain water*—although a most essential element for our existence, as organic life is impossible without it—*is in itself destructive of human life; and that it does not demand more victims than it unfortunately does, is owing to the presence of common salt, which protects the human organism against that destructive influence.*

VII.

THE surprise most probably felt about the morbid and the mortal[1] influence of plain water, will be joined by admiration at the wonderful effect produced in the human body by common salt (sodium chloride, in chemical symbols *NaCl*), in counteracting and preventing that destructive influence.

Although a great affinity exists between these two inorganic constituents of our body, there seems yet to be a kind of opposition displayed between them; or—shall we say?—they act upon each other as moderators: the destructive tendency of the water is moderated (prevented) by the presence of common salt, and the irritating action of the NaCl is subdued by the softening influence of water. Thus, at all events, we find them act in the human body.

To give a specific example, let us but consider the effect of NaCl on the blood-cells by the following experiment: Prick your finger with a clean needle, press out a drop of blood, and place this on a glass slide under the microscope. With an objective of sufficient power, you will distinguish the blood-cells as of a bi-concave disc form, provided your blood is in a healthy condition. Add to this drop of blood a drop of pure water, and you can observe the blood-cells to swell and to assume a spherical form. A further absorption of water will cause the cells, as already stated, to burst.

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[1] Mortal? Yes! For the reason that its abnormal accumulation, without a compensating supply of common salt in the blood, is the cause of heart failure, apoplexy, sunstroke, syncope, palpitations of the heart, etc., etc. (see *Common Salt*, under the various chapters).

If now, before such destruction takes place, a grain of NaCl is added to the watery blood, you can actually observe the globules gradually restored to their normal shape—*i.e.*, those cells, which have not been killed by the absorbed water, will give up this water to the salt solution, and again assume the healthy disc form. In those globules, in which the distension has gone too far, no alteration will be noticed; they are dead, and of no further use as carriers of oxygen to maintain the life of the organism; their presence in the blood, if at all in any quantity, causes serious disturbance in the system.

Sensational assertions have lately appeared in the public journals, as coming from "*Scientists*" in America, about the discovery of the "*Elixir of Life*," based upon the revivifying effect produced by the intra-veinous injection of a common salt solution. To place this—what should be called a "*re*"—discovery in its proper light, it may not be out of place here to call attention to the results obtained by Professor J. Ranke, which he published as long ago as 1868, in a work entitled, *Die Lebens-bedingungen der Nerven.* Dr. Ranke informs us the outcome of his extensive experiments to be that :—

(1) Distilled water is a poison to the nerves, and, when estimated by the time required to produce its destructive effect, it must be considered, in comparison with other toxic substances, as one of the most energetic poisons (pp. 53 and 71). (2) A slight

addition of a neutral potassium-salt—such as chloride of potassium—to the nervous substance causes the death of the latter (p. 71). He remarks, in relation to some future researches on that subject, that " so far we are already justified in looking upon a whole series of morbid symptoms as the direct effect of potash." (See *Common Salt*, pp. 56 to 64 and 265.) (3) Common salt (sodium chloride) in solution from 0.5 to 1.0 per cent. does not produce any destructive effect upon the living nerve, even after the latter has been immersed in the solution for several days together (pp. 54 and 74). To this may be added that a nerve, after having been nearly killed—either by water extraction or water absorption, or by potash salts—it can be restored to its original vitality *only* by an immersion in a standart saline solution (0.75 per cent. of NaCl). Professor Ranke further informs us that " Potash salts belong to the substances which cause fatigue in the muscles and nerve...... Nerve-fatigue and nerve-necrosis (nerve-death) are in their nature identical processes......The annihilation of muscular contractility is best illustrated by the action of the heart; when the substances, which caused the fatigue have been washed out by means of an injection of a standard (0.7 per cent.) solution of NaCl, the reappearance of the heart's pulsation is a truly astonishing phenomenon—so striking in its effect, that it forms a suitable lecture-demonstration " (p, 69).

The sensational character of this so-called discovery of the " Elixir of Life " becomes ludicrously apparent when we consider, that the good effect of NaCl can be destroyed by plain water. But—although it cannot deserve this grandiloquent name—it certainly can claim to be classed as one of the principal factors for our physical well-being; and the above illustrations have not given by any means a full account of the unequalled importance of NaCl for the human organism. It not only protects the blood, but also the lymph.

It keeps the albumen of the blood and of the lymph in a soluble condition (Lehmann).

It prevents the too-watery state of the brain and the nerves.

It regulates and intensifies the flow of all the various fluids on which the life of the organism depends (Voit).

It is essential for the action of the liver, and forms a necessary constituent of the bile (Liebig).

It is the medium for the elimination of effete, used-up, and hence poisonous organic substances out of the body, and is thus the best and most natural purifier of the blood (Liebig); in short,

It is a never-failing component part of the animal economy; it is absolutely necessary for the growth and the continued existence of the human body; there is no other substance in the whole universe which can replace it, and to abstain from it absolutely leads to certain disease and death.

Evolutionary biological researches have forced upon us the conclusion, that man had his origin in the sea; that the thread of human life commenced in salt water; that, as Professor Ranke expresses it: "In the blood we still carry the sea in our body"; and, most important of all, the embryonic development of every human being takes place in salt water—the Amnion water, which contains about one per cent. of mineral ingredients, chiefly NaCl.

This last information may well cause us to ask, What are we doing in the treatment of our children to maintain the supply of that protecting ingredient for their health, which they absorb through the skin previous to their birth? Can it excite any wonder that—after having left their pre-natal environment (the sea or salt-water element of their embryonic life), and not being furnished with a compensating supply of NaCl to their system—illness in various forms should overtake these young citizens of the world before they are many years, or even months, old? We might take a lesson from the ancient Hebrews, who were in the habit of rubbing NaCl into the skin of their babes. (See the chapters on "Sea-bathing" and on "Salt and Infants" in *Common Salt*, pp. 174 and 294.)

It is impossible, even from the above curtailed statement of the subject, not to be convinced of the momentous and paramount importance of NaCl for the health and the life of the human body, and of its beneficial influence for the prevention of disease.

VIII.

To understand how NaCl can be instrumental in imparting immunity to the human body against plague, cholera, and malaria, we have to inquire into the manner and the quantity, in which it enters, is retained and leaves the system; and we must further remember, that the just-named disorders are (as distinct from small-pox, measles, scarlatina, etc.)—blood-diseases, in which the office of NaCl consists principally in protecting the blood-cells. Here we must guard against the view, that NaCl is put forward as a *specific* against the above-named maladies. A mind entertaining such an idea, may look with suspicion and contempt upon the advice of administering NaCl as a medicine; it might be an unprofitable task to outroot such a view[1].

The obvious objection or doubt, which may be advanced against the assertion that NaCl can perform this protective function in the organism is: that common salt is already present in every human being —even when the supply is withheld; so that, did it possess the beneficial power claimed for it, it could exercise this power and prevent an attack without any further addition of it to the system.

In answer to this argument, it is necessary to point out, that salt can perform its various functions in the human organism only when it is present in sufficient quantity—in other words, that the salt, which is contained in the blood-serum to protect the red corpuscles, cannot act in the liver, or furnish the chlorine for the gastric-juice, or protect the lymph; that it cannot act like a magical specific, of which one dose will perform the wonder; but that it requires to be administered as a daily food to permeate the system with it.

The proportion of NaCl in the blood varies within comparatively considerable limits; it seldom exceeds six parts of salt in 1,000 parts of blood—*i.e.*, 0.6 per cent. Any amount, supplied beyond what is required to maintain that density, is expelled by way of the kidneys. We can hence, like other necessary food, take too much salt at one time; but repeated doses in small quantities, especially if taken in solution, pass through the system, and, as already stated, the salt, thus leavingthe body, acts beneficially by being instrumental in expelling effete organic substances.

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[1] As a medical critic remarked in his review (?) of *Common Salt*: "The idea of recommending common salt as a medicine—*salt that we*

This proportion of salt in the blood is, however, subject to great changes. Either through (1) entire abstinence from the use of it; or (2) taking it in insufficient quantity; or (3) washing it out of the blood by means of immoderate and continuous imbibing of liquids—we can reduce the proportion down to a minimum of 0.25 (in some diseases, according to Becquerel et Rodier, to 0.2) per cent. This amount is tenaciously retained; the blood will not part with it; and when more water is added to the blood (which is equivalent to a lowering of the salt-density), in that case a corresponding amount of the red corpuscles will be killed. (See *Common Salt*, pp. 49 to 52.)

Extensive experiments of eminent physiologists have determined the fact, that the absorption of a watery serum by the blood-cells depends upon the presence of NaCl in the blood in an inverse ratio—*i.e.*, the lower the proportion of salt in the serum, the greater is the absorption by the blood-cells. We can now understand the danger of an accumulation of water in the body; and we shall learn immediately, how such an accumulation is often the direct result of personal habit under the influence of climatic conditions.

It is not necessary to await the complete destruction of the blood-cells for the body to become a prey to disease in various forms; this susceptibility would such a fate. When the cells have absorbed the watery serum, owing to a deficiency of NaCl, they have become enlarged, and are thus incapable of taking up oxygen to the extent, which the health of the body demands. This leads to difficulty in breathing, to apoplexy, to so-called "sun-stroke," heart-failure, etc., etc.; and is the concomitant and premonitory symptom of many other ailments, often of a dangerous tendency.

What is of importance to notice for the purpose of our inquiry is the fact, that the swollen spherical cells have become soft and pappy; and it stands to reason that, in this condition, they can offer little if any resistance against the Plague-bacillus, or the Cholera-vibrio, or the Malaria-parasite, when one or the other kind of these microbes attack and burrow themselves into the watery cells. And thus it is that *NaCl can protect the system against such morbid and mortal attacks, by extracting the watery serum, and giving to the blood-cells a firmer consistency, by which to resist the microbe.*[1]

The above consideration will teach us that, when once the greater part of the blood is already destroyed, the NaCl is incapable—as all other means between heaven and earth, and especially so a disease-serum or any *scientific concoction*—of bringing these bursted blood-cells into life again; and that hence any remedy, intended to protect the blood, must be applied during the *earliest possible period* of an attack, and must be administered in *sufficient quantity* to save the blood from destruction. It will be necessary to remember this "early application" and "in sufficient quantity," as it will enable us to estimate the latest achievement in "scientific vaccination against plague" which will claim our attention immediately. For prophylaxis it will teach us the timely permeation of the organism with salt, to protect not only the blood, but—in plague—also the lymph in the affected glands.

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[1] There is no absolute law of nature, in virtue of which the human cell should not have as strong—if not a stronger vitality, than the pathogenic intruder, the bacillus; and this is confirmed, not only by

It has already been stated above, that any extra-corporeal condition which may have, or appear to have, any connection with the outbreak of epidemic diseases is, and has been, taken into account *only* in relation to the pathogenic microbe—its vitality and its virulence—but *has never been considered in its influence upon the susceptibility of the human body.* The question of climatic conditions furnishes an example of this—neglect or oversight. Says Dr. Wall, p. 137:—

> "In India a constant phenomenon of cholera is its increase directly after a fall of rain that has succeeded a period of drought. The recrudescence of cholera in Bengal that shows itself after the coldest months is almost certainly connected with the showers that first occur after a season of dryness. The severe epidemic of cholera in India of 1861 followed the storms that succeeded the complete failure of the rain of 1860. This can scarcely have had any other cause than the bringing into activity material previously dried up by the sun, but which had by no means lost its power by thus being dried.....It is remarkable, then, that Dr. Koch's theoretical cause of cholera and the real (?) agent should differ in so essential a particular."

Disregarding the bacillus, whether it has been killed by the sun's drying heat or is capable of "resurrection," and directing our attention to the human being and its susceptibility, we may solve the contradiction between Dr. Koch and Dr. Wall.

In a warm, dry atmosphere the evaporation from the skin is very active: the body is deprived of water, and thirst is the result, to quench which leads to imbibing quantities of liquid. In many instances the latter is resorted to—not to quench thirst, but to cool the body, which thus tends to surcharge the system with water. All liquid—whether originally taken as plain water, or in the form of tea, coffee, milk, soup, or the different table-waters—which leaves the body by way of the kidneys, or in less degree as perspiration by the skin, deprives the blood of NaCl; *it washes the salt out of the blood*, and, unless a corresponding amount is taken to replace the loss, it must naturally follow, that the proportion of salt in the blood reaches sooner or later its minimum.

So far no positive harm is done, except probably incidences of heart failure or sunstroke (about the true nature of which see *Common Salt*, pp. 278 to 286). But now follows rainy weather; the air is charged with moisture; this checks evaporation from the skin, and—as drinking, even of plain water, often becomes a pernicious habit, which is extended beyond the period of warm weather—the body is surcharged with water, and a watery state of the blood is the result. It endangers the life of the blood, and tends to the destruction of the red corpuscles; in fact, the system has developed a high degree of susceptibility for disease, the form of which is determined by the pathogenic influences, that may be active at the time. Plague, cholera, malaria, dysentery, and fevers of various kinds will successfully attack the body; and the general popular view, that either having caught a cold, or having been exposed to rain or to a damp atmosphere, as the immediate cause of the ailment, can be interpreted by this salt-impoverished state of the sufferer.

The evil results of this salt-impoverished state of the system, and the dangerous watery condition of the blood, make themselves felt in many cases during dry, hot weather, before the rainy season sets in, which accounts for the periodical outbreak of the disease. Dr. Wall informs us that "Cholera is endemic at the mouth of the Yang-tsze-Kiang; but it only exists there during the months of July, August, and September, and part of October. It then dies away, only to reappear in July of the next year."

What the natural history of the bacillus cannot interpret, is thus simply explained by the individual susceptibility, as produced by personal habits in the use or non-use of NaCl, and the relative watery state of the blood.

A cold and dry or a warm and dry atmosphere meets with general approval; but cold and wet weather produces one crop, and warm and wet weather (heat and moisture in the tropics) produce another—the so-called tropical diseases—all for want of NaCl in the human body.

IX.

It may be considered that enough has been said in favour of NaCl as a prophylactic remedy for the prevention of plague and cholera, to silence all reasonable objections, and to make any further recommendations for a practical trial needless. When we, however, survey the attempts that have been made to prove the success of serum-injection in its general combating the plague, we shall receive further positive support in favour of NaCl, in a manner which will excite surprise.

Notwithstanding the public statements to the contrary, it can safely be asserted, that serum-injection has failed all round, in its prophylactic and its curative powers—so confidently proclaimed. Lord Lister, when receiving the "Harben" medal, assured us that "The deaths from diphtheria had been reduced to *zero* by the help of the study of bacteriology."

Yet for weeks at the time, when such an assurance was given to us, the deaths in London alone from that disease occurred at the rate of 2,000 per annum. What could his Lordship have meant by *zero?* Equally incomprehensible is Lord Lister's assertion, that "the efforts which are now being made to exterminate consumption are entirely guided by the results of bacteriological studies."

It must be still fresh in our memory that the discovery of *tuberculin*, as the result of Dr. Robert Koch's bacteriological researches, held out a cure for the consumptives; but that it ended in a sad and grevious disappointment to thousands of sufferers, as it did not fulfil the promise of its discoverer and his enthusiastic disciples. And because this "result of bacteriological study" has failed, and because this "result *could* NOT *guide them*"—this is the reason why medical men adopted the open-air treatment, *which has no connection with bacteriology*, and which existed in some form long before the tubercle-bacillus was discovered.

And the last attempt, of making serum-injection an acknowledged therapeutic agent (against enteric fever), has also proved an utter failure; the accounts from South Africa showing that its application has had quite a contrary effect from what its "inventor" intended and promised. So will it be with serum-therapeutics against plague.

With the same supercilious smile, with which at the present time medical men look back upon the errors and blunders of their professional ancestors—who, seventy or eighty years ago, among the hundreds of different medicines against the plague, prescribed: "the blood of sundry animals mixed with various products from the vegetable and the mineral kingdom; extracts from the rattlesnake; the juice pressed out of fresh horse-dung; human urine, etc., etc.; and ordered purging (which has, according to Dr. Müller, demanded a greater number of human victims than have fallen in the fiercest wars); bleeding, recommended even as a protection before infection, and which has caused streams of blood to flow" (see *Die Pest*, pp. 283-4)—so will a future generation of medical practitioners look back smilingly and pityingly upon our present generation of serum-injecting medicoes.

When it is borne in mind, that the paramount object of all medical activity is the cure of disease and the prevention of premature death, and when we see the extensive efforts that are being made in ascertaining the cause and the origin of disease as compared with the results achieved, the question must naturally occur to any observant mind: Do not these efforts claim more attention than they deserve? Are not the pursuit of these subsidiary branches of medical science and art cultivated at the expense of the main object? What is the use of describing symptoms, giving names to them, of observing, of diagnosing, of investigating, etc., etc.—UNLESS it leads to some practical means for the cure or prevention of disease?

The German Plague Commission admits in its Report, that its principal aim has been, to place the diagnosis upon a firmer basis (see Report, p. 71). But this has not assisted in the slightest degree towards the discovery of any prophylactic or curative remedies. Similarly the British Report.

The *Lancet* of January 22nd, 1898, p. 250, declares in reference to General Gatacre's Report on the Bubonic Plague, chapter iii., that it

> "Gives a very excellent summary of the medical aspect of plague derived from the views expressed by the medical officers working under the committee.
>
> "Reviewing opinions generally, the following is a rational classification of forms of plague:—
>
> > "(1) With enlarged glands (gravity according to symptoms and severity of attack), femoral, inguinal, axillary, cervical, tonsillar.
> >
> > "(2) Without enlarged glands (almost always fatal), septicaemic, pneumonic, mesenteric, enteric or gastro-intestinal, nephretic, cerebral.
>
> "The signs and symptoms of these various forms are then given, followed by a section on a ready method of diagnosing plague."

It would be difficult to assert, that the author of the above Report was conscious of the object he had in view when compiling this "rational" classification of "forms of plague"; for, if even it enabled him to make a true diagnosis, to decide whether the form of disease was "inguinal" or "axillary"—whether it assumed a "pneumonic" or "mesenteric" character—was there any specific medicine or any special treatment for each form of the malady which insured the saving of the life of the patient?* The Report may answer:

> "It is difficult to recommend any particular line of treatment with

> confidence; for it is often seen that a plan of treatment which succeeds in one case totally fails in another."

What in the name of common sense is then the use of such "*rational classification*"? How true, what Dr. Milroy says, that

> "To describe at length the different varieties of plague which have been enumerated by authors would be very unprofitable, and only serve to obscure a subject which has often been made unnecessarily intricate by extreme verbiage in the attempt at over-subtle distinctions."

The following confession of Dr. Müller (*Die Pest*, p. 284), published in the year 1900, sums up the result of medical efforts against the plague. He says:

> "When we survey the enormous deposit of medical armoury which medical Art and medical Infatuation have invented and applied in the battle against the plague, and when we are reminded of the conviction which experienced and unprejudiced observers of plague epidemics must have arrived at with regard to the reliability and efficiency of any therapeutic measures, there is forced upon us the question: whether it is not more than a simple self-delusion when we talk about a plague therapy (or plague treatment)? whether the plague patient does not recover or die all the same, whether medical art stood at the bedside or not"?

The only means that has been tried as a therapeutic agent—viz., inoculation—has been half tolerated and half doubted by the various Plague Commissioners; and those members of them, who were attacked and had to go into hospital, refused to be inoculated: they preferred to fight the plague without serum-injection.

And how this question stands at the present moment is the subject of a paragraph in *Nature* (of 29th November, 1900, p. 112), where it is stated:

> "The value of anti-plague serum is a very vexed question. *Yersin*, in 1896 in China, claimed a mortality of only 7.6 per cent. in 26" (!) "cases treated with his serum, and the same observer, in 1897, in India, using Roux's serum, stated that the mortality was only 49 per

cent. as compared with 80 per cent. among the cases not treated with serum. The Indian medical officers and the German Commission, however, reported unfavourably upon his results, and the serum treatment of plague has not been" (legally) "adopted in India. Clemow, in India, in 1899, employed both *Yersin's* and Lustig's sera, but was unable to observe any good results from the use of either. On the other hand, in the outbreak of plague in Oporto last year, Calmette and Salembeni claim to have obtained excellent results with the use of serum prepared in the Pasteur Institute by the most recent methods"—about which more immediately. "....Calmette holds that, for successful treatment, the anti-plague serum must be administered *in large doses*, intra-veinously to commence with, and afterwards by, repeated sub-cutaneous injections—*early treatment being essential.*"

It is necessary to notice that (1) large doses and (2) early treatment are insisted upon, as we shall understand the importance of this advice (see ante, p. 32) when learning the latest outcome of serum therapeutics, as described by Professor Calmette in the third "Harben" lecture, delivered at the Examination Hall of the Royal College of Physicians and Surgeons, in London, on the 22nd of November, 1900 (therefore, only quite recently), and reported in the *Times* of the next day.

The Report states, *inter alia:*

"The short duration of the immunity it bestowed, together with the material difficulty of procuring it (the serum) in sufficient quantity to vaccinate and revaccinate a large number of individuals, rendered it necessary to seek a practical means for giving men an active immunity by means of the *plague virus itself.*"

What can possibly be the motive, which induces these professors, to hold out promises of protecting us by means of plague virus, when it has been proved to every sensible man's satisfaction that one attack of the disease itself cannot give immunity? Neither is it true that a second or third attack is always milder; the second, like the first, can be mild or mortal.

According to Griesinger, the second attack is frequent and dangerous; and Müller sums up the question by saying that, undoubtedly, repeated attacks occur and end mostly unfavourably.

Hence, the one attack, whether it is the result of a natural or an artificial infection, confers no immunity; and this proves the utter inutility of anti-plague serum-injection.

Next, the Report of the lecture proceeds:

> "During the past year, Professor Calmette said, he had been carrying on experiments with a view to obviating the principal objections, and he described a process by which he obtained bodies of dried plague bacilli *free from every trace of toxin*, the injection of which *produced no grave local reaction.* When he wished to vaccinate animals" (and, by inference, also men), "he took a quantity of these microbes, *apportioned by weight* according to the kind of animal, suspended in a fixed quantity of sterilised SALT WATER, and injected it under the skin or into the veins."

So, then, all these important bacteriological researches and experiments during the last six years have ended in the use of dried-up bacilli, free from every trace of toxin, and producing no grave local reaction—in fact, perfectly harmless and apparently used merely to give a scientific colouring to the whole procedure; and if any beneficial effect is produced, this may be claimed as the result of the *injection into the circulation of COMMON SALT in SOLUTION.*

Shades of LIEBIG—how applicable is still your exclamation:—

> "Truly, one is tempted to adopt the opinion that, among the sciences which have for their object a knowledge of nature and her forces"—and which demand for their application the exercise of simple logic—"medicine, as an inductive science, occupies the lowest place" (Liebig's *Letters on Chemistry*, 1851, p. 77).

The procedure of Professor Calmette—to employ an anti-plague serum, which has no trace of toxin in it, and can hence not affect the human organism—is in direct contradiction to the principle upon which, it is alleged, all serum-injection is based—namely, to produce an attack of the disease, in order to confer immunity, and for which he recommends, a few sentences further back, "plague-virus itself."

The whole subject of anti-plague-inoculation,—whether in its pseudo-scientific foundation, or in the competitive methods and concocted rival "vaccines" (suggested or employed), or in the glowing but problematical statistics of results achieved—in all its aspects it is calculated to excite absolute distrust, and justifies the condemnatory judgment, publicly expressed by gentlemen in high official positions, as an example of which it may be repeated here, what Sir Henry Blake reported from Hong Kong for the year 1898, that "So far medical science appears to be equally at fault as to the prevention or the cure of the plague."

As an error and as an example of the uncertainty of medical science and art, it is excusable. But when such means, after its futility has become evident, is persisted in, while another remedy—which has not only a strong scientific basis, but also many social and pecuniary points in its favour, and which, for that very reason, deserves to be tried—is not only neglected, but its application positively refused and opposed; then the men, who are responsible for this neglect and opposition, whatever their position in relation to either the government or the people—*deserve to be publicly indicted.*

X.

No human being of ordinary understanding can deny the favourable and promising aspect, held out by the use of

NaCl for the protection of the human organism against epidemic diseases; nor can any one advance valid reasons against an experiment, on a sufficiently extensive scale, to establish the prophylactic, if not also the curative powers of NaCl, if he weighs the question honestly and without bias or professional prejudice.

I am even persuaded to believe that, upon an appeal, we should gain the support of a great, if not the greater number of medical practitioners in favour of such an experiment for so laudible an object: which will *beneficially affect the well-being of the whole human family.* I am confirmed in this belief by the encouragement and acknowledgment, which I have received, often in flattering terms, in my endeavour to disseminate a knowledge of the hygienic importance of NaCl, from gentlemen of such high scientific standing as Professor Dr. Max von Pettenkofer (the great authority on Cholera), and Professor Dr. Hans Buchner (who can claim a foremost position in medicine and hygiene); Dr. Gottstein (author of *Allgemeine Epidemiologie*), and many others.

There seems to exist, however, not only among the non-professional public, but also in the ranks of the medical men, a certain hesitation, if not fear, of advocating or recommending so common a substance as common salt ("salt, that we eat"), under the impression, evidently, that by the mere favourable mention of it, or by expressing the probability of its prophylactic powers, they might run the risk of seeing their educational status lowered in the eyes of their listeners or their readers; whereas the fact is, that by their non-recognition of NaCl in its all-powerful action and agencies in the human economy, and of its absolute necessity for the existence and well-being of our organism, they truly display a lamentable ignorance, and, under certain circumstances, a pedantic conceit.

I bring this latter charge against the medical advisers of the Indian Government, for opposing—and, much more so, for not sanctioning—the suggested experiment. Among the many "*medicines*" which have been experimented upon, I may incidentally mention belladonna; it was tried by a promising young M.D. (London) in Bombay. But what connection is there, either chemically, physically, or physiologically, between belladonna on the one side, and the human organism, when suffering from the plague, on the other? Scientifically, none whatever! The doctor, who suggests or undertakes such an experiment, does not stand higher in his "scientific" reasoning than the "quack-shepherd" who proposes to cure (and sometimes actually does cure) by means of a concoction of herbs. Both, the doctor and the quack, proceed strictly by guess; both are true "empirics"; and so far as their science goes the medicine, with which they experiment, may consist of any fortuitous substance, from asa-fœtida and strychnine to innocent bread-pills.

How true what Professor Beneke, a philosophic and conscientious worker in the science of medicine, says (in *Grundlinien einer Pathologie des Stoff-wechsels*, p. 320):

> "The generality of practitioners work with the most powerful agents in the form of medicine; with iodine, mercury, arsenic, quinine, and a host of others; but the fate of the organism, so far as it depends upon its integrating inorganic constituents, is left to kind

the most rational method of curing disease is employed by removing these conditions; in our case *by restoring the inorganic ingredients to their normal proportions.*"

It is, therefore, quite evident that the opposition to the experiment—for installing NaCl as an effective prophylactic agent against epidemic zymotic diseases—has no scientific foundation, and cannot proceed from any reasonable objection to the proposed substance, but arises from prejudice against it, and from disregard of its physiological importance.

Different from the frame of mind, in which the subject is judged by the professional critic, is the view entertained among so-called "laymen." When the ordinary every-day person takes a draught of, say, ·1 per cent. salt-solution—to which, in itself, he so far raises not any objection—he begins to have some misgivings about its utility, when the effect is not immediately apparent, like that after a dose of Epsom Salts, or of a rhubarb pill. In fact, upon this disappointment rests the low estimation in which NaCl is generally held. It requires some two, often three or four, weeks of a daily dose before the effect makes itself thoroughly felt; and then, very probably, the acknowledgment is not given to the salt. Similarly, when people abstain from taking salt, or use it in insufficient quantity, it will require from two to three months (according to the original amount in the system) before its proportion has been reduced to a minimum, to the margin of danger; and when, in consequence of this reduction of salt in the blood, an indisposition, or a more serious ailment like a "cold," or rheumatism, or dyspepsia, or palpitation of the heart, or pleurisy, etc., overtakes them, they declare, as a matter of common-sense, that it cannot be the result of salt abstinence, as they have enjoyed decent, if not very good, health ever since they ceased taking it.

Suspicion is often aroused by the enumeration of the diseases against which NaCl is recommended as a preventive agent. To those who think, as already remarked, that for each malady there exists a special medicine, I would offer the following simile :—

The human body can be wounded or killed by a stone, an arrow, a dagger, a lance, or a bullet. The sensible man would for his protection not suggest an anti-stone, or an anti-arrow, or an anti-bullet, but would logically apply a *Steel Cuirass*, to protect himself against all these missiles.

Common Salt is the " Cuirass " which protects the red corpuscles in the human body against the attacks of the greater number of pathogenic missiles.

How many lives would not have been saved had this " cuirass " been applied to our soldiers in South Africa who have succumbed to enteric fever in an alarming number !

XI.

WHEN, in January 1899, I published a treatise on " The Plague in India," I sent copies to the Professors of Physiology at several European Universities, inviting their criticism upon the views advanced therein, and begged the favour of their opinion about a suggested experiment for establishing the efficacy or the failure of NaCl as a prophylactic, and probably as a curative agent against the plague.

I received replies of various kinds; but among those which expressed approval of the experiment, special mention must be made of the letter with which I was favoured by the eminent bacteriologist, Professor Dr. Hans Buchner, President of the Hygienic Institute of the University of Munich. The letter is reproduced *in extenso* in an appendix to the above-named treatise; it suffices here to give a few extracts, which contain the gist of Professor Buchner's opinion, to the effect that no one could be more convinced of the correctness of my views than he was. He further states:

> "Ever since 1890 have I brought forward evidence of the facts that the natural power of resistance of the organism against bacteria depends directly upon the amount of its mineral constituents..... that the bacteria-killing faculty of the normal blood-serum—upon which the natural protective powers of the organism against bacteria chiefly depend—is lowered and ultimately destroyed in proportion as the mineral constituents, especially sodium-chloride, are abstracted from the serum....and (in 1893) I added the second proof, that the bacterium-killing qualities of blood-serum—after having been made ineffective through the abstraction of common salt—could be restored again by the restitution of the lost salt."

He further states:

> "An organism, deficient of salt, may be compared to one which contains an abnormal quantity of water, and possesses, like this latter, a diminished resisting power against infection....That such a deficiency of NaCl, when it exists, can be very harmful, and must essentially increase the pre-disposition for infection, I consider, in accordance with my experiments, as certain. And the possibility of such deficiency of common salt, which I did not think probable for Europeans, I must admit as possible for the inhabitants of India. In conclusion, I do not hesitate to give my full support to the practical experiment as suggested by you. I consider it to have a strong scientific basis, and that it is for this very reason, urgently demanded, being besides perfectly harmless. I should hence feel highly gratified were the British or Indian Government to decide to accede to your request and institute an experiment of distributing NaCl among the members of a community in which plague has broken out."

In a letter received from Professor Max von Pettenkofer, this eminent physician writes: "Your

Plague in India I have read with interest, and I support your suggestion that the experiment with salt should be made there."

Among the many acknowledgments and communications which my work on *Common Salt* has elicited I produce only those which refer to India. All these letters are sent unsolicited by gentlemen unknown to me, and who could have no other motive for doing so, than to support and promote a grand beneficial object.

The following extract is from a letter sent by a gentleman, who resides in the Riviera :

"I have read your work on *Common Salt* with great pleasure and interest, having, for the most part of my career in India, been a great advocate for its use, and I attribute my immunity from all serious illness, while in that country (some thirty-five years), to being a regular salt eater. My duties, at times, took me into parts of the country where malarial fevers and cholera were very rife ; and it is alone to this preventive that I consider I enjoyed good health, and suffered no ill consequences....and, as I mentioned before, I have had no serious illness during my life—thanks to salt."

Another gentleman, for many years resident in India and Egypt, relates his experience in these countries, among other statements, as follows :—

"In 1873 I was in charge of a Government stud in Bengal where cholera prevailed in the villages all round. I read, in Braithwaite's *Retrospect of Medicine*, about a doctor in the West Indies treating the last seventeen cases of cholera there with iced sea-water, and they all recovered. So I wrote to an English chemist in Benares to prepare for me a large jar full of sea salt, giving him the proportions of the various ingredients. I think he sent me about ten or twelve pounds. There was no English doctor within twenty miles, so I gave a quantity of the salt to a native doctor, who had obtained a dilpoma in the Government Medical School at Calcutta. I distributed the remainder among some villagers, who were suffering badly, telling them to dissolve it in water, and to let the patients drink frequently, at the same time rolling them in blankets, to cause perspiration. The native to my bungalow, and thanked me for giving them the 'medicine.' They said that twenty-five people were attacked, and all recovered after taking it. I always took a fair amount of salt, and have been in eight places where there were outbreaks of cholera—some of them very virulent—and I never had a sign of the disease. I am strongly in favour of an ample supply of salt as advantageous to the health of all, except carnivorous animals—especially in hot climates. The natives are full believers in its being good for health; but the heavy tax laid upon it by the Government prevents the poorer classes from buying enough. If this were abolished, or even reduced to one quarter of what it is now, I believe that the lives of thousands of natives, as well as of cattle, would be saved annually. The cattle cannot receive much now, on account of the expense being too great. If the tax were one-fourth of what it is, I believe that the Government revenue would not decrease, because the natives would buy the salt in far greater quantities."

A special mention deserve the letters received from one of India's most enlightened Rajah, who writes (in February, 1900):—

"I have immensely benefited by the advice you kindly gave me in one of your letters" (to hasten the protection against another attack of malarial fever by a daily second or third dose of salt solution), "and I now feel ten years younger by following it."

The Rajah, who is about fifty-eight years of age, has received a medical education, and is thus able—free from professional bias—to give an independent opinion about the practical value of NaCl for the well-being of the human body. In relation to the plague, he remarks:—

"To you it must be a matter of extreme pain, that while there is a sure and cheap prophylactic and cure at hand, that the Government should be so very indifferent as to its claims, and should not even think of giving it a trial in a limited area at all events. I feel this pain quite, perhaps, as much as you do."

With such support and recommendations as are expressed in these unsolicited letters, when combined with the inherent scientific merit of the subject, it seems difficult to understand, on what grounds an appeal for a trial can be refused. It would be a futile attempt, were this knowledge of the prophylactic effect of NaCl diffused promiscuously, without method and without circumspection, as the success in even thousands of individual cases would never carry full conviction to the doubting mind. To do this, it is necessary that an experiment, on a sufficiently large scale, should be carefully arranged, carried out with method, and checked in its result with honesty and without bias. Is this impossible? Let us see.

XII.

In the above-mentioned treatise, *Plague in India*, the suggested experiment and *modus operandi* are described in the following words:—A community of, perhaps, 20,000 inhabitants—among whom the plague has made its appearance—is selected. To supply these 20,000 persons with half an ounce of common salt per day for a month (the period of the experiment), will require 1 lb. per head, that is altogether 20,000 lbs., or roughly 10 tons of salt. This should be dealt out in proportionate quantities of 3½ ozs. per head per week, in the first instance accompanied by printed instructions, informing the people of the benefit and the necessity of salt for their health, and describing the manner of taking it—that is, a part with food (even all farinaceous food should be cooked in slightly salted water), and the greater portion in solution, with the warning never to drink any water, unless it has some salt dissolved in it.

With the view of seeing such an experiment instituted as above suggested, I appealed to the Secretary of State for India, Lord George Hamilton. In reply I was requested to address my communication to the Plague Commission then sitting in India, and when I pointed out the inutility of such a procedure and the prospect of my appeal being drowned in the labours of the Commission, I was directed to send my papers to the Indian Government, which would be more competent to deal with the subject. Acting upon this instruction, I sent in March, 1899, a letter with books and papers to His Excellency the Viceroy, Lord Curzon. The receipt of my appeal was duly acknowledged; but, beyond this, I received no further intimation of the Government's intention respecting it.

When in July last (1900) the Indian Government publicly admitted the failure of the measures which had been employed up till then, I renewed my request for "a practical trial of the proposed remedy on a sufficiently large scale to establish its efficacy or its failure in an incontestable manner." To that appeal the Viceroy's Secretary replied:—

> "His Excellency thinks that an experiment such as is suggested by you....would be absolutely inconclusive. The Viceroy considers that it needs very little acquaintance with the natives of India to know that it would be hopeless to expect any reliable data from (such) an experiment....The general fact that natives in jail, who are invariably supplied with half an ounce of salt, have not shown, that they are immune when exposed to the liability to attack of plague or cholera—and the result of experiments by experienced authorities, do not seem to His Excellency to justify an acceptance of your scheme."

But who are these "*experienced authorities*," under whose guidance his Lordship dictated this reply? Is the subject of saving the lives of the Indian people of so unimportant, so trivial, a nature as to be settled by a mere assertion unsupported by scientifically attested facts? And why should such an experiment be *absolutely inconclusive?* It may fail for two reasons, (1) because the suggested remedy contains within itself the germ of failure, or (2) because the habits, views or prejudices of the natives interfere.

The first of these reasons is fully answered in the above exposition of the whole question, and need not engage our attention any further. Not knowing what experiments his Excellency relies on, I cannot make a direct and specific rejoinder to that objection against a practical trial; but I may be permitted here to remark that the distribution of half an ounce of salt, said to be *invariably supplied* to the natives in jail, is an unsatisfactory datum upon which to form a judgment without calling into question the frequency, with which such a supply is renewed; and with still greater force, without any reference to the amount of liquid taken habitually by the prisoners during the twenty-four hours. The expectation of obtaining protection and immunity by such an indefinite and uncertain supply of half an ounce of salt, without taking into account these qualifying conditions, would appear to be based upon the assumption that the salt acted in the manner of a *medicinal specific*. The irrationality and the unscientific character of such a view have already been fully dealt with.

The second cause of failure may be looked for in the social and mental conditions—such as habits, rites, or prejudices—of the natives of India, with whom the experiment would have to be made; and to the circumstances in and under which they live. Surely, if the suggested remedy holds out any promise of success, in that case the—what may be termed—mechanism of the experiment should not offer any difficulty, that details of the experiment to suit such circumstances of Indian individual, social, and municipal life.

It may appear at first sight improbable to expect the natives to pay much attention to the proposed experiment. But—are they, with all their tendency to fatalism, really so indifferent to their bodily welfare? Would it not be possible to interest them in the subject by lectures, by books or pamphlets, and thus gain their practical support—if not with enthusiasm, then, at all events, with the sober knowledge, that a great good will accrue to them and to all India by such an experiment? And when information has thus been spread among the members of the selected community, it surely would not be impossible to obtain the assistance of a number of intelligent people to supervise the distribution and the proper use of the salt.

Should the selected community be accessible to the sea, in that case the consent and the willingness of the inhabitants might be obtained to the use of sea water for daily consumption; the water to be drawn every day fresh from the clearer regions of the ocean, for which temporary machinery could easily be erected.

In agreement with these prophylactic measures would be the treatment of those persons, who were suffering from an attack of plague or cholera at the time, when the experiment would be commenced. Our past inquiry would indicate, that the first care should be to permeate the patient's system with NaCl in solution (either by means of intra-veinous injections or by way of the mouth), repeated at frequent intervals. The salt solution, as a mere beverage, will give life and tone to the stomach; will, after the second or third dose, prevent vomiting, if it should not stop it with the first draught; and its strength, if desirable above the 1 per cent. standard solution, is easily and quickly adapted to suit the individual case. With this should be combined artificial perspiration. By such means can the body be permeated with NaCl, since the greater portion of the salt taken in the solution will be retained up to the maximum density.

Of the greatest benefit would be the salt or sea-water bath, kept at or near the temperature of the blood, and safely maintained for half an hour or longer, and often repeated, without fear of producing syncope, as expressed by Dr. Wall in his pressing recommendation of warm baths. He says (p. 114):—

> "Judiciously used, the warm bath is one of the most powerful means we possess of relieving the acutest symptoms of typical cholera. It has been advised to keep the patient for a long time in the bath, but we should fear to do so on account of the syncope in cholera."

This fear of producing syncope need not be entertained in the use of warm *salt*-water baths, for reasons fully given in *Common Salt*, pp. 11 to 15 and 181 to 184; and which will be readily understood when remembering, what we learnt above, about the effect of plain water and of salt water on the blood.

Whoever has grasped the principle, which underlies the whole exposition of the subject, will readily devise and modify the application of the suggested remedy to make this latter effective; and the objections, which the people of India have expressed and practically evinced against the measures adopted for suppressing the plague, and, above all, against the inoculation into their body of a disease-serum, will be replaced by a readiness (on the part of the ignorant as well as of the educated portion of the public) to accept this simple and natural treatment of epidemic-zymotic diseases.

In the original proposition for the trial I made an estimate of the probable cost of such an experiment. This would come out as follows: the salt would cost about £12 per ton (that is £3 for the salt and £9 for the Government tax); hence the total cost of the salt would be £120. The printing of the instructions, say 10,000 hand- and 200 wall-bills, may possibly come to £5. There remains the cost of distribution and of supervision of the proper use of the salt, during one month. The number of officials required for this purpose may be assumed as thirty to forty, at a rough cost of £350, so that the total expense would amount to £500. Would it be impossible to obtain that sum for so noble and grand an object from the nation, which subscribed £100,000 for a Technical Institute in Khartoum? But supposing that the number of supervisers required be 100 or more, to insure an unfailing and proper consumption of the salt-solution once or twice per day, to overcome the natural indolence or indifference on the part of the natives—what is the expenditure of even £1,000 for such an experiment, considering the promising and incalculable benefit that will accrue for all mankind from the undertaking?

My application to the Government of India having resulted in a non-acceptance of, what the Viceroy deigns to call, my *scheme*, I addressed a letter to the Guicowar of Baroda, appealing to His Highness for his interest, to further the object, for which I pleaded; but have, after several months, received no acknowledgment of the receipt of my

Judging from its name, I concluded that the subject would come within the consideration and discussion of the East India Association, and approached the Secretary for that purpose; but, upon the discourse being submitted to the Committee, it was referred to *experts* and declared *inappropriate*.

No doubt, so long as the solution of the question will depend upon the decision of *experienced authorities* and so-called *experts*; that is, upon members of the medical profession, so long will there be little probability of so common a substance as common salt being used and acknowledged as a prophylactic agent; it would lower the scientific character of medical science to employ "salt that we eat." As the individual physicians will wrangle about their lame therapeutic principles and systems at the bedside of a dying patient, and think more about upholding the vaunted professional honour by withdrawing from contact with a medical heretic than they show anxiety for saving the patient's life, so will the *experienced authorities* allow thousands of human beings to die rather, than that the nimbus of their position be sullied by the acceptance of a simple remedy for the prevention of disease.

It must naturally develop a bitter feeling of contempt mingled with resentment, when we are told that all laws of nature, from those of logic down to those of simple mechanics, when applied to the human body, are beyond the comprehension of the non-medical mind; that, for the estimation of the results of medical art, the *zero* of mortality means 2,000 deaths per annum; that titles and public rewards are earned by the inability of preventing thousands to perish from of such "Experts" is simply an arbitrary *non-possumus;* they cannot bring forward any scientific reasons for their refusal; it is sheer obstinacy which, combined with non-fulfilment of medical promises, explains, if it does not justify the existence of *ex*-professional disease-curers and medicine-vendors (the quacks outside the profession), and drives the *laity* to the adoption of measures for their protection, independent of Government-medical interference.

We are naturally reminded of *Ouida's* remarks in *The Culture of Cowardice* (*The Humane Review*, July, 1900, p. 113):—

> "Why should the doctor or the surgeon be accredited with being an immaculate and infallible *Uebermensch?* His process is precisely the same as that of every religious hierarchy; he disdains to explain"—but can he?—"he insists on blind subjection, in return for which he promises protection and salvation."

He "enthuses" himself over bacteriological researches, makes experiments upon man and animals, and is most diligent in studying all diseases:—

> "Um es am Ende geh'n zu lassen
> Wie's Gott gefällt."

But with all his studies and experiments, with all his titles and rewards, men suffer and die, as if medical science did not exist.

The most guilty of *Ouida's* Cowards, held in mental bondage by this medical tyranny, are the Editors and the "penny-a-liners" of some of the public journals and magazines, who, in their conceited ignorance, support and spread every silly sensational statement to pander to the gullibility of their readers, while snubbing or ridiculing any attempt at correcting popular errors, when such attempt tends to disturb the accepted medical doctrines; and fancy, that they have proved their superior judgment by the destruction of a manuscript.

Considering now:

> The admitted failure of the means, that have been employed during the last four years (in Hong-Kong during six years);
>
> The important vital functions performed by common salt in the human organism, as explained in the foregoing discourse, and so universally ignored;
>
> The unequalled beneficial results, which have been obtained by the injection of a common salt solution, in the treatment of cholera, and the adoption of the same means, according to Professor Calmette's statement, as the latest therapeutic agent against plague;
>
> And considering lastly: the recommendation of a practical experiment, coming from gentlemen like Professor Dr. Von Pettenkofer and Professor Dr. Buchner, who both stand, as scientific authorities, head and shoulders above those "experienced officials," who have decided against the experiment;

considering all these points, I venture to declare that this unreasonable opposition to the suggested trial of common salt as a preventive of Cholera and Plague, and of thus saving human lives, has no scientific basis, and tends to suggest unworthy motives, which evince a callous disregard for the lives and the welfare of the Indian people.

I cannot be considered as guilty of unjustly indicting the Government of India for this opposition, or of inciting a rebellious spirit among the natives, when I invite them, conjointly with the British public, to the formation of an

Association for the Prevention of Epidemic-Zymotic Diseases in India,

with the object of promoting and instituting the suggested experiment.

Such an Association would partake of the character of similar societies, formed here in Europe for promoting the *Open-Air Treatment of Tuberculosis,* in which the professional and the non-professional public unite in amiable competition. The formation of such an Association cannot contravene the laws of India; nor would its existence and its acts appear as a want of confidence in the individual medical man. On the contrary, it may be expected, and hoped for, that the greater number of independent medical practitioners will join the Association, considering the grand object for which it would be established.

Neither can it be regarded as a direct attack upon the salt tax, although it may lead ultimately to a reduction of the latter, without, however, causing a diminution in the total revenue. The lowering of the tax would naturally induce an increased consumption, and would thus compensate for a reduced rate. Such fiscal reflections should remove any hesitation on the part of the Indian Government in sanctioning, if not actively promoting, the formation and the acts of such an Association.

That the openly-expressed recognition, if not the material support, of the Government would be of the greatest importance in the eyes of the general public, and promote the success of the undertaking, is beyond

Neither need the question be raised whether India has not among her inhabitants a sufficient number of intelligent gentlemen, public-spirited enough, to promote, support, and even actively aid in so noble an object as that of giving to mankind the prophylactic means against the scourges which not only decimate India, but have proved the destroyers of human lives in all regions of the earth.

It is no exaggeration when declaring that the whole subject is of unsurpassed and of far-reaching importance for the future of the human race.

APPENDIX.

MALARIAL FEVER AND THE CONTROL OF THE TROPICS.

It is generally admitted, that sooner or later, mankind will be confronted by the great problem: How the white man can live, labour and not degenerate in the Tropics.

This question has forced itself—although not yet with any serious pressure—upon the statesmen and political economists of the colonising nations; in fact upon all thoughtful men who exercise their mind on the future development of the human family; and inquiries of all kinds and in every direction point to the *Prevention of so-called Tropical Diseases* as the principal weapon, by means of which we shall be enabled to conquer the Torrid Zone and gain what has been termed

"THE CONTROL OF THE TROPICS."

Among these diseases, which attack not only the white men from the temperate zone when transferred to a hot climate, but also the aborigines of the latter, *Malarial Fever* is the predominating disorder, which demands its victims by killing thousands and by

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Among these diseases, which attack not only the white men from the temperate zone when transferred to a hot climate, but also the aborigines of the latter, *Malarial Fever* is the predominating disorder, which demands its victims by killing thousands and by ruining the constitution, more or less severely, of tens of thousands.

This is most appalling and reflects discreditably upon medical science. That such mortality and suffering can be prevented, is not only a matter of belief, but is attested by facts. I once received the assurance of an old sea captain, that he had spent twenty-five years at Sierra Leone, and had never suffered a day's serious illness. And his looks supported his assertion. It would be bold indeed to attribute his escape to accident. For—what we have learnt in relation to Plague and Cholera, also applies to Malaria: there are human beings who are immune against the disease; they carry the pathogenic poison in their body without yielding to the infection. Hundreds of Europeans have resided and have been actively engaged during a number of years in the equatorial regions, without suffering from any of the so-called tropical disorders in a serious degree.

This immunity seems, however, not to have attracted the attention of those medical men who have made the subject of tropical diseases their speciality. These gentlemen have, instead, concentrated all their efforts, and directed the assistance of the Government and of charitable people, to the establishment and the maintenance of *Schools of Tropical Diseases* for the "*Study*" of this class of disorders; and as Cholera and Plague have been *studied* for nearly a century without leading to any definite [practical results, so it may be expected that this study of Malaria and its propagation by the Mosquito (Anopheles) will not bring us any nearer to the solution of the question: How to prevent and cure Tropical Fevers.

Considering that, when the attack does not end fatally, it leaves behind in the majority of cases a ruined constitution, it must be evident that the question of "*Prevention*" is of first and foremost importance. No ultimate object can be gained by allowing Europeans to go to the Tropics and contract the disease, and then bringing them back as objects of study, with a minimum prospect of restoring them for future tropical life and activity. It must hence appear as the dictate of simple logic, that our first object should be to investigate the cause of this natural immunity, and apply the knowledge thus gained to the protection of the susceptible portion of the Europeans, who from choice or from necessity go to tropical countries.

What we have learnt in the preceding discourse about the nature and prevention of Cholera and Plague, applies here also to Malaria; this disease, in its serious symptoms and its fatal issue, consists in the destruction of the red blood-corpuscles;[1] that these latter, owing to a watery state of the serum, swell, become soft and pappy, and thus yield to the attack of the Malarial Parasite. And we may thus also expect, that NaCl will form the "*Cuirass*" to protect the corpuscles against this tropical enemy.

It is needless to say much about the infection through the mosquito bite; the assiduous and very expensive search for the Anopheles; the sensational telegraphic announcement: "Malarial mosquito found; ask Government send at once men" (?); the suggestion to fill up or drain all the water-puddles in Africa, etc., etc. The immune inhabitants of the torrid zone will smile at all this purposeless hubbub; and so will, probably, also the mosquito.

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[1] See *The Etiology and Prevention of Malarial Fever*, by Dr. Klein; *Nature*, vol. 58, p. 175.

Dr. Koch, when reporting his researches into the cause of "Black-water Fever" (*Reise-Berichte*, p. 120), refers to the first case (he uses in illustration) in the following words: "The patient 'X' has been in East Africa only eight months; has never had any serious illness when at home (Germany), but had an attack of fever already a few months after his arrival."

Already a few months after his arrival. The incubation period of Malarial fever is at most about ten or twelve days.

Query: Why did the Malarial mosquito not bite this newcomer? Or, if he was bitten, why did he not suffer infection immediately, but only a few months after his arrival?

Are not these phenomena in perfect harmony with the views here contended for—namely, that the young European brought with him a strong blood from his home in the temperate zone; that the high temperature of East Africa caused him to imbibe large quantities of water, by which he washed the NaCl out of his blood, during a period of several months; and that thus his organism developed a high susceptibility for the disease, which might have been prevented by the daily supply of common salt?

But what are the means employed to cure Malarial fever? Quinine, and again Quinine; although Dr. Koch, who swears by it, declares that it is the cause of "Black-water fever" (that is, a fever, which may be described as the severest and most deadly form of Malaria, in which the dissolved blood—the bursted blood-globules—darken [blacken] the urine, hence the name), and about which he admits that it seems to act upon some constitutions as a severe blood-poison.

Among the thousands of notices and papers, there is only one which refers to another *medicine.* The *Daily News* (Sept. 2nd, 1899) contains a paragraph on "The Study of Tropical Diseases," in which it is stated that "Dr. Kerr Cross, the medical officer of the Protectorate, who has made a special study of Black-water fever, strongly favours oil of turpentine in preference to quinine in the treatment of patients suffering from this disease."

Oil of turpentine to restore the dissolved blood-corpuscles! Verily, verily. The ways of medical science are inscrutable.

In conclusion, I make an appeal to the Professors at any of the established Schools of Tropical Medicine, where they have the material and disease-germs at their disposal, for the following experiments.

Submit a drop of healthy blood, which has been extra fortified by the addition of a grain of NaCl, to the infection of the Malarial parasite.

Next perform the same kind of experiment with blood which has had some plain water admixed with it, by means of which the blood-corpuscles have been distended short of bursting: to observe the facility with which the parasite burrows itself into the softened blood-globules.

Next place a drop of blood which is infected by the parasite under the microscope, and watch the effect that is produced by the addition of a grain of NaCl to the blood.

The successful results will induce to further experiments in administering NaCl in solution to patients

As the Indian Rajah, above referred to, has benefited by the triple dose per diem, and found himself protected against Malaria, so there is hope, if not certainty, for other human beings to be protected against Tropical Diseases by the use of

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ITS USE AND NECESSITY
FOR THE MAINTENANCE OF HEALTH AND
THE PREVENTION OF DISEASE.

BY

C. GODFREY GÜMPEL,

Fellow of the Physical Society; Associate of the Institution of Civil Engineers; Associate of the Institution of Electrical Engineers; Member of the British Astronomical Association; etc.

Criminal is the ignorance which causes Disease and Death.

London:
SWAN SONNENSCHEIN & CO., Ltd., Paternoster Square.
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CONTENTS.

To the reader, by way of preface—What is the use of it?—Inducement to study the subject—What is common salt?—The physical properties of salt—Salt in history—Salt in civilisation—Distribution of salt—Salt in the human body—The blood—Salt in the blood—Quantity of salt in the blood—Want of salt in the blood—Potash salt in the blood—Potash salt and the heart—Oxygen in the blood—Deficiency of oxygen in the blood—Sudden death—Heart disease—Salt and the liver—Salt and digestion—Salt and the kidneys—Salt *versus* Water—Thirst—Scurvy—Cancer—Salt and the nervous system—Other objections against the use of salt—How much salt?—How to take the salt—Sea-water and mineral waters—Sea and salt water bathing—Disease—Salt and disease—Merely a cold—Rheumatism and gout—Dropsy—Anæmia and chlorosis—Individual immunity—Cholera—Typhoid and other fevers—The plague—Serum treatment—Diphtheria—Influenza—Small-pox—Salt and life in the tropics—The salt tax in India—Salt and infants—Salt and vegetarians—Practical experience—Salt no panacea—What should be done?—Salt and the doctors—Concluding remarks.

APPENDIX: Illness of H.R.H. the Prince of Wales—List of some cases of sudden death—Glossary of terms—Index.

OPINIONS AND CRITICISMS.

Professor Dr. Max von Pettenkofer, Privy Councillor, late President of the Hygienic Institute of the University of Munich, and one of the foremost members of the medical profession in Germany, specially ordered a copy of the work from London, and states that he read it with interest, lent it to his friends to read, and complimented the author on the many original ideas contained in the book.

The Hon. Raja Peary Mohun Mookerji, C.S.I.—late Member of the Indian Council under Lord Dufferin, and one of the most enlightened men in India, who has had a medical education, which he still employs to give medical advice to his numerous tenants—"has been delighted and astonished with your book" (writes an English gentleman resident in Calcutta, who is a friend of the Raja), "and says that he considers it one of the most useful books this century has produced." The Raja himself has favoured the author with a letter, in which occurs the following passage: "It is a remarkable book. If it be widely read and its lessons loyally acted upon, it should......confer a lasting boon on mankind. My first impulse on reading the book was to ask myself how was it that it has not made a noise in the world? ......Whatever the verdict of the medical profession may be on your work, I for one cannot help offering you my sincere tribute of admiration and gratitude for the invaluable treasure which I have found in your book," etc., etc.

Mr. J. L———, the above-cited friend of the Raja, calls it "Your epoch-making book on 'Common-Salt.'"

A gentleman in Australia, who received a copy of the work through his daughter in London, declares that, "dealing with a scientific subject, it is the most readable book I ever perused. If I had my way, I would have it as a reading-book in all our schools, for there is not a line in it but what should be not only read, but thoroughly understood by every boy and girl in the country."

In a subsequent letter he reports the successful application of hot sea- and salt-water baths for a period of three months in the case of Rheumatism combined with Atrophy, which had resisted all other treatment; and conveys the cured patient's thanks to the author for having written the book.

In a letter from a reader of the book in New York the author is called "a benefactor of mankind."

The Glasgow Herald (evidently written by a medical man) says: Many medical men will be inclined to look with suspicion on a book dealing with the functions of salt in the human economy, written by one who is not himself a member of the profession; but the *greater number will read from cover to cover with interest, and agree in the main with the author's conclusions.* Apart from the medical profession, *a careful study of the book* by laymen *will well repay the time spent in doing so* on account of the nature and variety of the information it contains.

The London Review: Mr. Gümpel has produced *a most fascinating volume.* It is as interesting as a novel, and *it is so brightly written* that we should prefer it to many a novel it has been our sad lot to peruse......What that treatment is we must leave our readers to find out for themselves from *this most entertaining and instructive volume.*

The Scotsman: The book has much to say for itself, and that is of an interesting and suggestive kind. It deserves to be read and weighed-up by the medical profession; and a lay-reader could scarcely study it without *deriving from it much good instruction in the principles of health.*

The Echo: It is a full inquiry into a whole set of questions, and it furnishes answers with respect to all. They deserve reading.

The Chester Courant: We cannot too strongly recommend a perusal of *this common-sense work* as a valuable guide to the maintenance of health.

The Publishers' Circular: The book deserves something more than the curt dismissal, which the professional man is too apt to give to works of the kind, which emanate from anybody but a medical man.

The Nottingham Guardian: The physiological reasons upon which Mr. Gümpel's theories are based are clearly stated.

The Saturday Review: These and many kindred facts Mr. Gümpel sets out with knowledge, clearness, and vivacity.

The Times of India: The book is one of great general interest to the educated reader, and *is not without pregnant suggestion to the statesmen of India.*

The English Mechanic: It certainly puts the case for Salt very forcibly and very fully......It *covers a much wider field* than the use or non-use of Common Salt......Those who wish to know why we take Salt with our food or why we should get it into our bodies should *read his very interesting book.*

Food and Health. Supplement to the *Sanitary Record:* *He has given the thoughtful reader a really fascinating treatise,* full of startling asseverations, and striking at the very root of many of the supposed fundamentals of medical and other sciences. There is something in the book for the mother, for, in the chapter, "Salt and Infants," the author becomes delightfully satirical as he deals with the notions and ways of the modern nursery. It is "Sugar" for everything, but of "Salt" there is never a word. The *book is worth reading, and if it succeeds in a small degree in its aim and object, it will not have been written in vain.*

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MOSQUITOS

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MOSQUITOS

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MALARIA.

A popular account of the Mosquito together with a brief explanation of its rôle in the dissemination of Malaria

BY

FREDERICK PEARSE, F.R.C.S., ENG.,
M.R.C.P., LOND., D.P.H., CAMB.,

SPECIAL PLAGUE MEDICAL OFFICER WITH THE GOVERNMENT OF BENGAL.

With Illustrations.

Calcutta:
W. NEWMAN & CO.

1902.

Extract from "THE LANCET" *of 17th May*, 1902.

MOSQUITOS AND MALARIA

We have received a copy of a lecture delivered at the Dalhousie Institute, Calcutta, on April 8th of this year, by Dr. T. Frederick Pearse on Mosquitos and Malaria. Many such lectures and addresses have, of course, been delivered during the past two years, but there is always room for a good, clear, popular exposition of the complicated pathological story implied by the title. And Dr. Pearse's paper was a good *résumé* of the results of the investigations which have been made as to the causal relationship of the mosquito to malaria, couched in the proper phraseology for a discourse not intended for an entirely medical audience. The information that he gave in regard to the natural history of the mosquito is exactly the data that the layman wants, for he cannot be expected to be much impressed by a theory which he cannot follow. The speaker described the development of the mosquito through the various stages of metamorphosis in an able and lucid manner, so that even those of his audience who knew nothing about entomology must have thoroughly understood all the facts which he brought forward. The differences between the genera culex and anopheles were carefully described, and their habits and customs were duly drawn attention to. Dr. Pearse then proceeded to relate what he termed "one of the fairy tales of science," namely, the nature of the parasites found in the blood in cases of malaria, and the changes which they undergo when received into the mosquito's stomach after the insect has been feeding on the blood of an individual suffering from malaria. He showed further how the old observations on malaria might be explained on the mosquito theory, and finally he indicated the precautions which persons living in malarious districts should adopt in order to avoid contracting the disease. He also suggested various methods for attacking the breeding grounds of the anopheles. Dr. Pearse was successful in condensing into the space of a lecture a large number of interesting facts concerning one of the most valuable of modern medical discoveries

PREFACE.

THE following pages are an expansion of a lecture delivered in Calcutta, the object having been to explain the Mosquito-Malaria theory in a popular way.

Many points of Medical and of purely Scientific interest are necessarily omitted.

The author does not pretend to any originality, but trusts that his compilation may prove interesting and instructive to those for whom it is intended.

CALCUTTA, *October*, 1902.

PRINTED BY W. NEWMAN AND CO.,
CAXTON PRESS, CALCUTTA.

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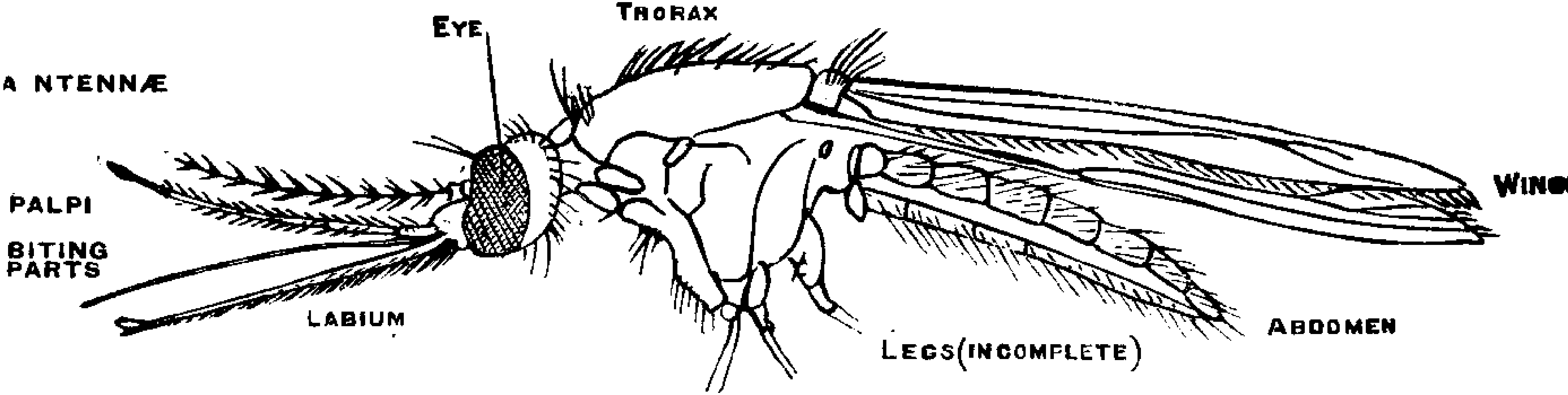


FIG. 1.—SIDE VIEW OF FEMALE ANOPHELES.

CHAPTER I.

THE EARLY LIFE OF THE MOSQUITO.

EGG—LARVA—PUPA.

The great interest given to the study of mosquitos during recent years, in consequence of the discovery of their association with the disease known as Malaria, has been productive of a large addition to our knowledge of these insects.

The word mosquito is a diminutive of the Spanish "mosco," a fly. It is a term generally given to the well-known insect of the tropics, but the same insect in England and Europe is more often called a "gnat."

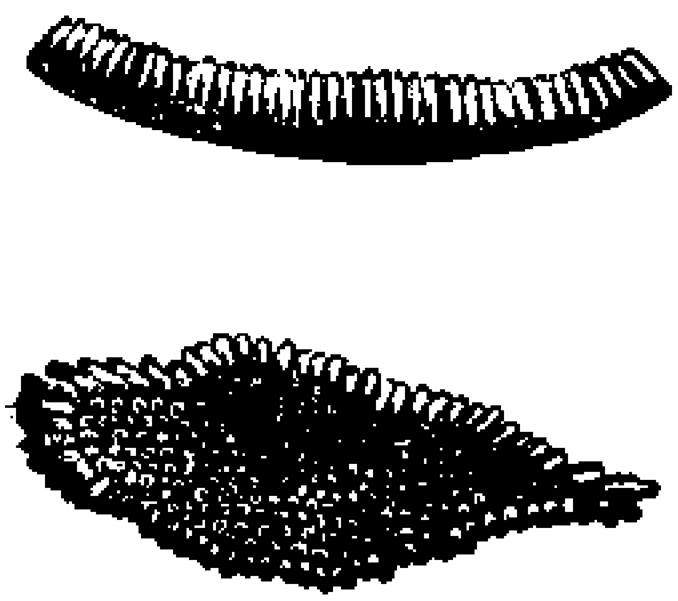
Mosquitos or gnats are most likely to be confused with midges and sand flies—with midges because they are found in much the same places and to the naked eye appear so similar—but on minute examination there are considerable differences.

Mosquitos are distinguished from other two-winged flies by the proboscis and by certain scales on the wings, but all insects possess certain distinguishing characters. In these little animals, the head, chest and abdomen are distinct. They possess three pairs of jointed legs attached to the under surface of the chest. Respiration takes place through air tubes which wonderful changes of form and structure known as "metamorphosis."

This transformation consists of four stages: The egg develops into a larva, known as a maggot, or grub, or caterpillar; the larva changes into a pupa or chrysalis; and finally the pupa is transformed into the perfect insect.

We will just follow the development of the mosquito through these various stages. The first three stages are passed in the water—the last, *viz.*, that of the perfect insect, on the wing. I shall take the common mosquito for my example, and point out the differences later on. The mother mosquito haunts moist and watery places, and lays her eggs on the surface of stagnant pools. When laying her eggs, the female alights on some floating body, crosses her hind legs, so as to form a sort of slide, and drops her eggs one by one until an elongated boat-shaped mass is formed. The eggs are glued together into a sort of little raft or boat, which, when complete, is dropped into the water, and floats about. The mother insect then flies away. The eggs are like caraway seeds in form and colour, and a mass of them may number two or three hundred. Fig. 2.

FIG. 2.



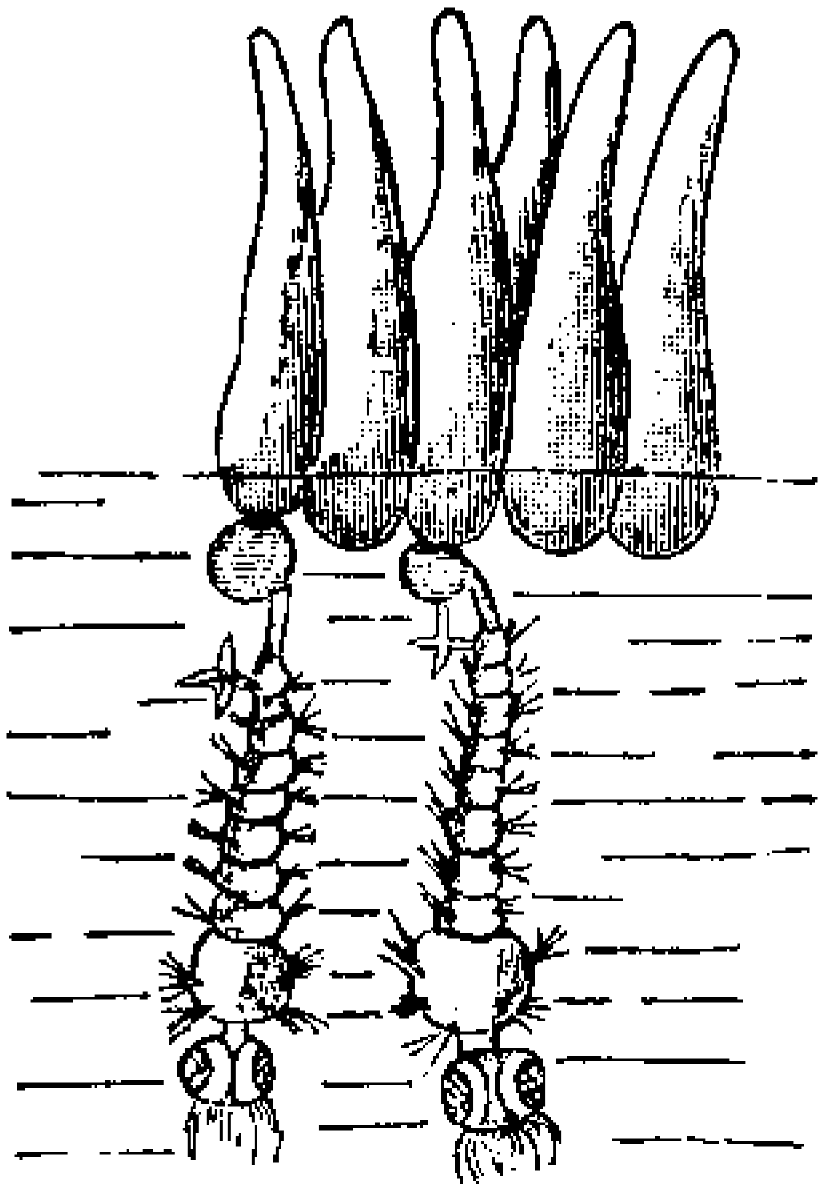
EGGS OF CULEX

The eggs, at first white, become greenish, and finally a dark grey. They are from ·7 to 1 mm. in length.

After about three days the eggs hatch, and the active little larvæ

The eggs are opened by a circular split near the blunt end of the egg. A sort of lid or door opens on the under surface of the egg, and the larva, at first very tiny (just large enough to be seen by the naked eye), comes out head first, and immediately begins to wriggle actively about in the water. Fig. 3. Under the microscope you can see that it has a distinct head, with two large dark eyes, behind that a globular body, and then a bristling tail of several segments. As the days go on he grows, and when he has attained full size, he measures about ½ inch long.

FIG. 3.



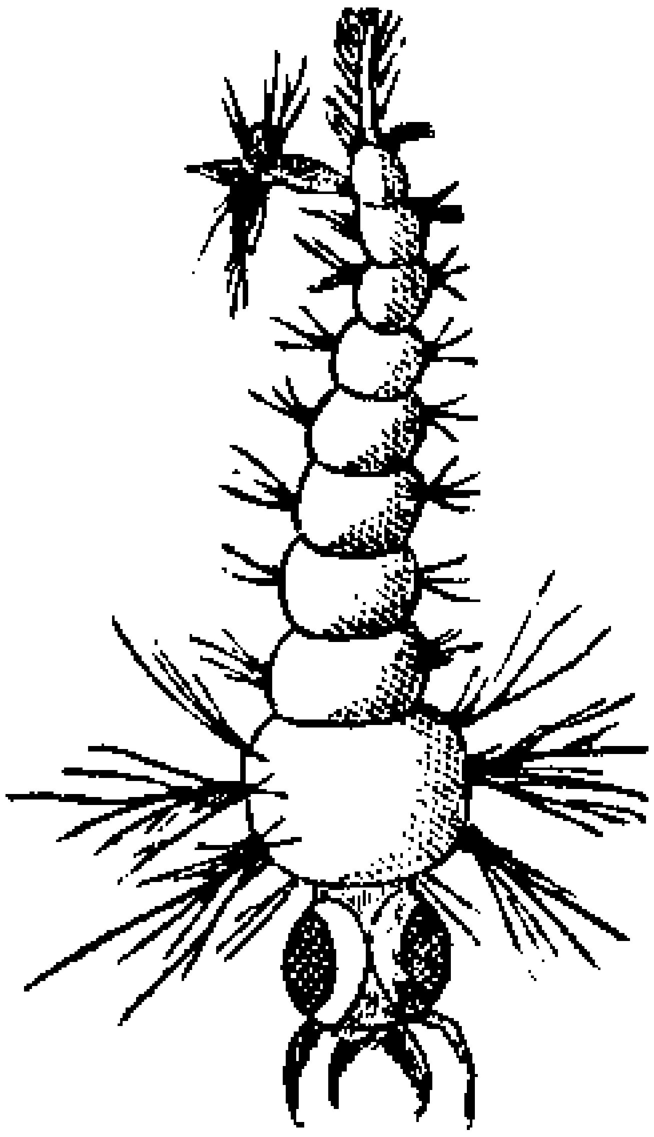
HATCHING OF LARVÆ.

At the tail end of the larva are two interesting structures—one like the screw of a steamer which acts as a fin or rudder, and the other is a hollow stalk or breathing tube. The larva breathes through his tail.

The opening of this breathing tube is protected by valves, which open and close according to requirements.

This breathing tube communicates with internal air channels which ramify through the insect somewhat like our blood vessels. In our bodies the blood is carried to the lungs to be purified. In insects the air circulates in tubes through the body. Fig. 4.

FIG. 4.



LARVA OF MOSQUITO

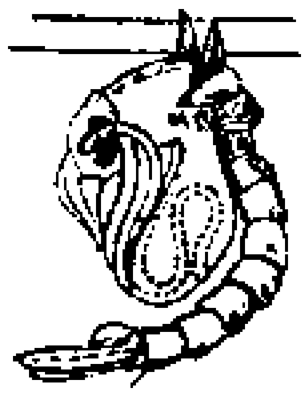
Our little larva is a very voracious animal. His heavy moustache keeps lashing about to draw anything eatable to his maw, and he is continually moving about in search of food. He must come up to the surface, however, every now and then to breathe. He then stands on his head and "cocks" his tail up into the air. The changes which took place in the egg during the few days were simply marvellous. If the larva has not the outward form, he has nearly all the internal structure of the perfect insect. He has got a brain and nervous system, a heart, a breathing apparatus, and organs of digestion.

The larvæ are preyed upon largely by small fish, but they obtain protection in the aquatic vegetation, especially at the shallow margins of ponds.

This larval stage in the life of the mosquito lasts from 8 to 20 days, chiefly depending on the temperature. During this time he is steadily growing, and he sheds his skin two or three times. At the end of his growth he becomes irritable, and swims about fitfully.

Then he comes to rest, the thoracic region becomes swollen, and suddenly a slit appears in his back, and after some kicks or wriggles the pupa or nymph emerges, and the skin cast of the larva sinks to the bottom of the water. In this stage our mosquito is a different creature again. He has now got what looks like a swollen head, but he has lost his mouth, and he eats nothing. Fig. 5.

FIG. 5.



PUPA OR NYMPH CULEX.

The whole of the head and thorax or chest is enveloped in a thin transparent membrane.

He is very active, however, in the water, but his method of breathing has entirely changed. Instead of breathing through his tail, he now breathes through two little trumpet-shaped tubes situated at the foremost part of his chest. As he floats back up, quietly breathing, his head appears tucked in under.

Although, when disturbed, he darts to the bottom, he soon rises again on account of his buoyancy. Reservoirs of air keep the young insect the right way up, and also tend to make him float. He moves by lashing his jointed abdomen about like a tail.

This life lasts but a few days, but during it great changes go on inside the young insect. As the pupa grows the skin seems to separate from the developing mosquito within, so that a layer of air is formed, which tends to float the animal to the surface.

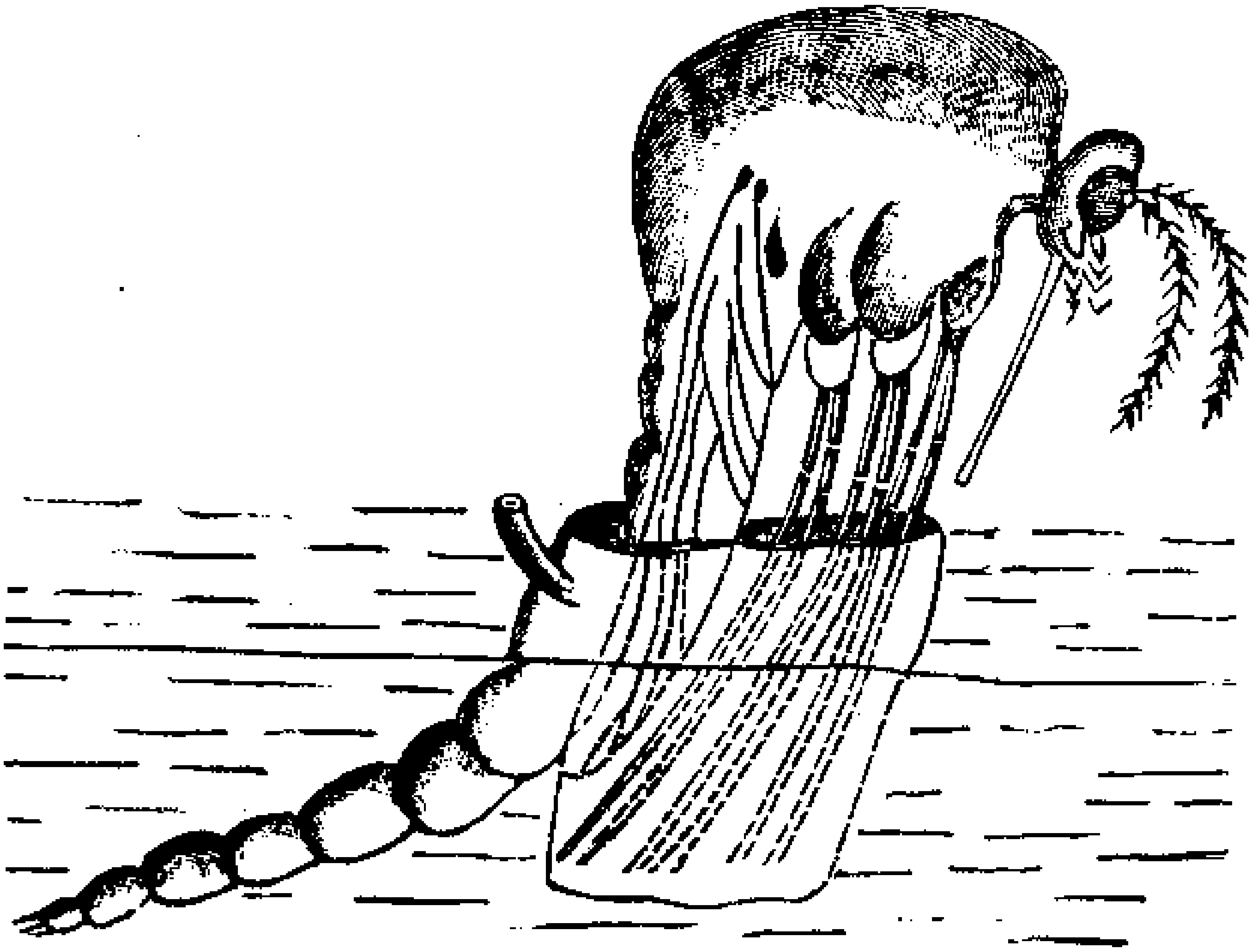
The time occupied in these stages of growth is—

For The egg ...	about 3 days.
The Larva ...	from 16 to 22 days.
The Pupa ...	from 3 to 4 days.

The actual time depends very greatly upon the temperature, warmth hastening and cold retarding growth and development. From the date of the birth of the larva to the formation of the perfect insect occupies, therefore, roughly about 3 weeks. The perfect female insect may lay eggs in about 20 days after her liberation from the pupa case—sometimes perhaps sooner—so that from the time of the laying of an egg to that when the hatched mosquito lays her eggs occupies from 6—7 weeks. In this way it can be seen that several generations can be formed in one season, especially in hot climates.

When the time comes, the top of the pupa case opens by a slit, and the perfect insect, in a very hump-backed position, breaks through the top. Fig. 6. The

FIG. 6.



THE PERFECT INSECT EMERGING FROM

insect coming out of its pupa case looks very much like a lady coming out of her ball dress. It raises itself on its legs, withdraws its wings and tail, plants its legs on the buoyant skin-like pupa case, and lifts itself well into the air. The dry air after a few minutes enables it to unfold its wings, and it flies away or rests for a time on the surface of vegetation. Some insects emerge very rapidly, even in a few moments, especially if disturbed, others take several minutes. Many fail to free themselves properly and die in delivery, and some in their efforts to get loose may lose one or more of their legs. They are generally able to fly within 5—10 minutes, but if anything disturbs them before the wings are dry and "set," they are very liable to be drowned.

Sometimes, however, if the surface of the water be ruffled, the boat-like pupa case becomes unsteady, and the wings get wetted. The young mosquito cannot spread them, and it is soon drowned.

Nothing, however, is wasted, for very soon its carcase is eaten up by voracious larvæ, who hope in their turn of growth to be more successful.

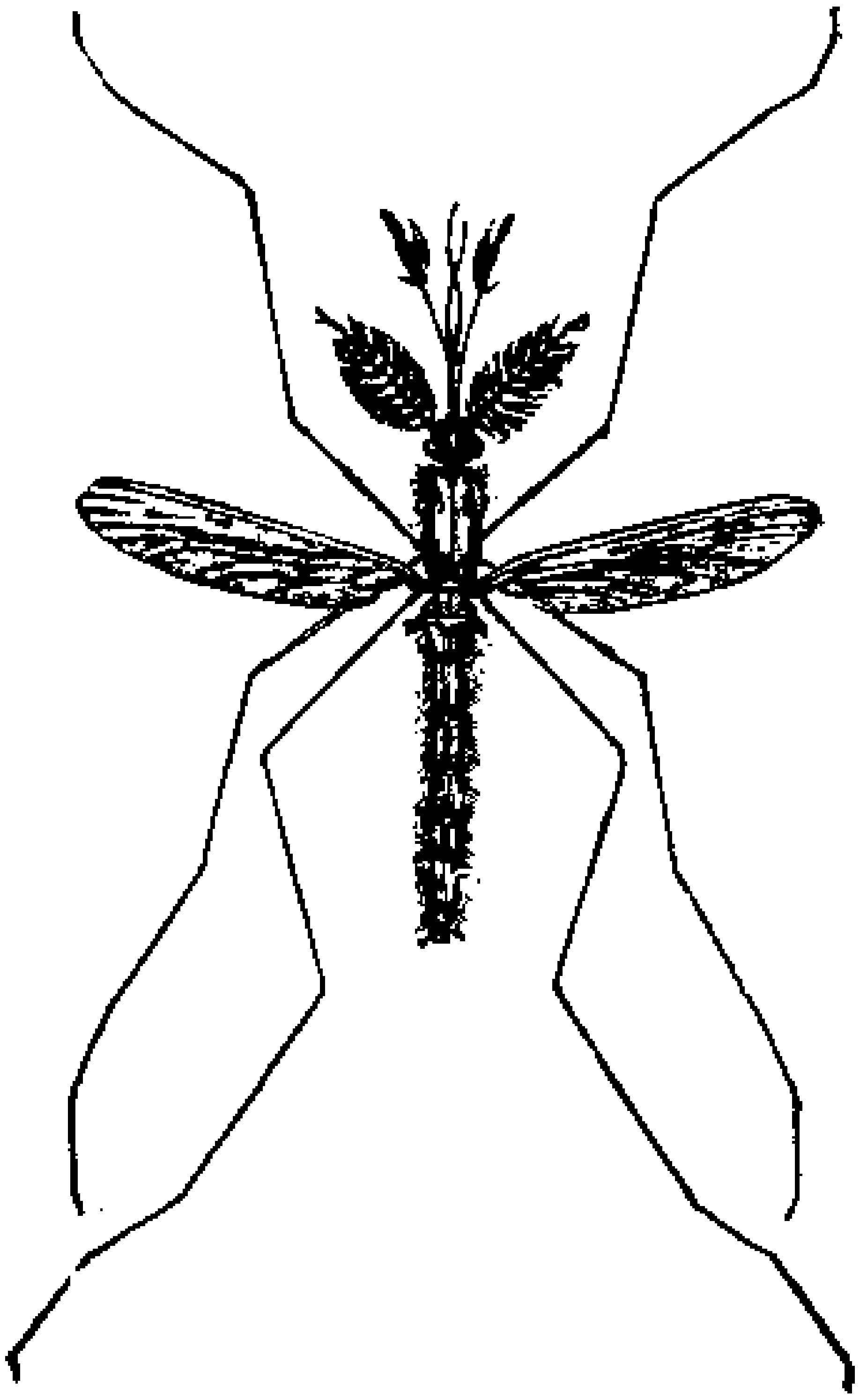
Sometimes again the water may dry up, and the pupæ are soon killed, but if they happen to be stranded on moist places, they continue their development.

CHAPTER II.

THE PERFECT INSECT—ITS STRUCTURE AND CONFORMATION—ITS HABITS.

We have now arrived at the stage of the perfect insect. Note the globular head with large eyes and prominent proboscis, the distinct oval chest about twice the size of the head, and the long segmented abdomen. Look at the six jointed legs and the pair of beautiful gossamer wings. Fig. 7. These are the things which strike us at first sight, but within its body the mosquito possesses a very complicated mechanism. There is a brain and nervous system, an organ of circulation in the form of a long valved tube which pulsates with a worm-like movement, a breathing apparatus consisting of air tubes branching from holes on the sides of the chest and ending in tufts of branches to the muscles and organs, and a digestive system comprising salivary glands, gizzard, gullet, stomach and bowels.

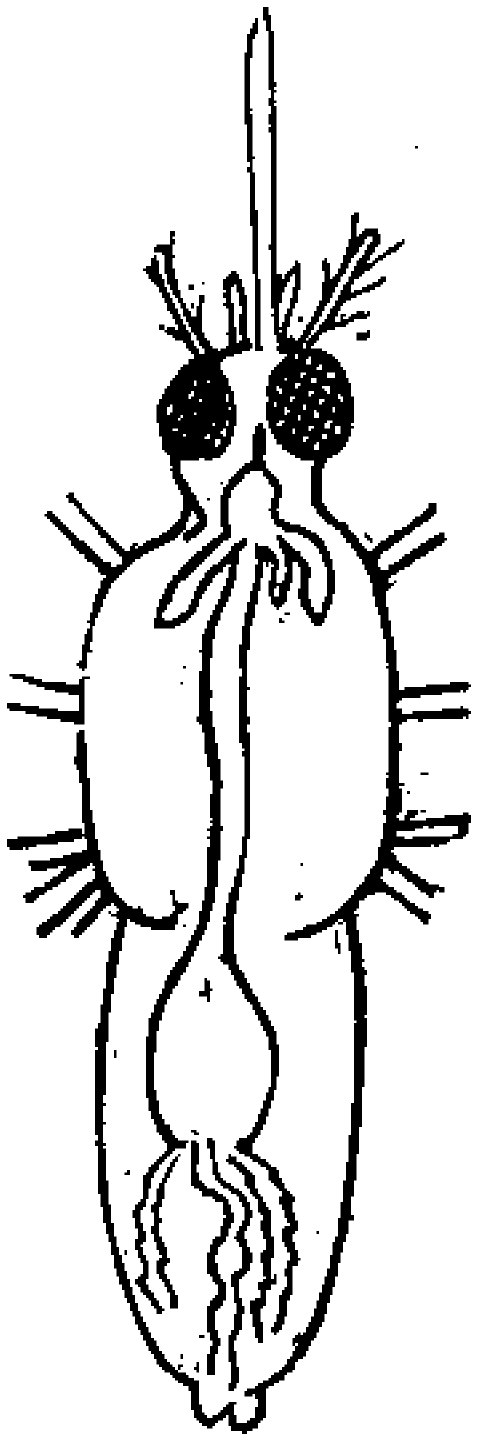
FIG. 7.



A PERFECT MALE MOSQUITO.

The head contains the organs of sense and the brain; the chest is chiefly filled up with the muscles which move the wings and the legs; and the abdomen contains the more important organs of digestion. Fig. 8.

FIG. 8.



SECTION OF BODY.

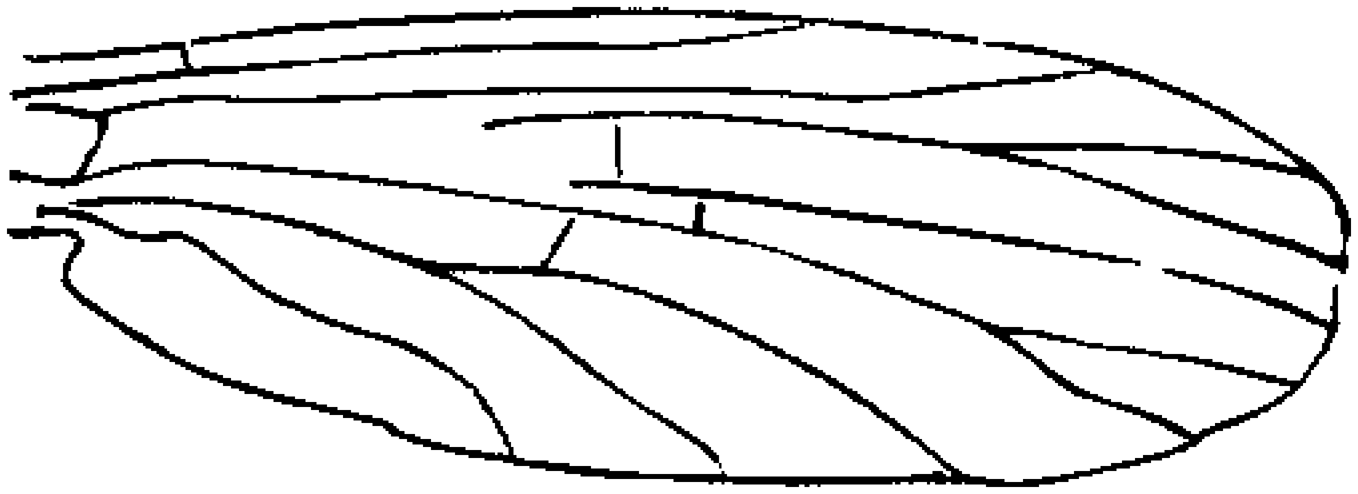
The legs are made up of hips, thighs, shanks and feet, and at the tip of the feet are sharp pointed claws.

The markings on the delicate beautifully-veined wings are largely made use of to distinguish different species.

The wings also vary in size. Those of the female are generally larger than those of the male. In some insects the colour is brown, or grey, or greenish black; in others beautifully marked. Fig. 11.

The organ which will perhaps prove of chief interest is the proboscis. This differs considerably in the male and female. Note the whiskers or plumed antennæ of the male, forming tufts in front of the head. He looks vicious, and has a somewhat military appearance, but he is as mild as a pet

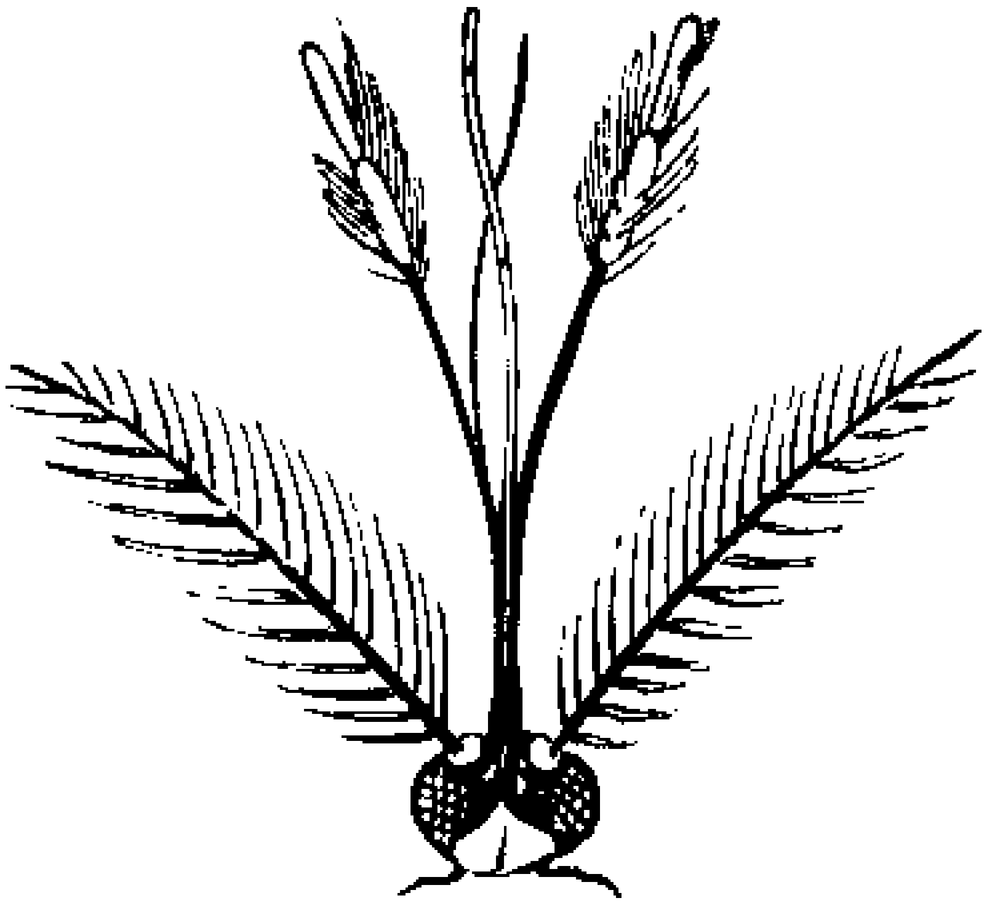
FIG. 11.



SHOWING THE MARKING ON THE WING.

lamb, and he is a harmless honey-sucker. The female looks quiet enough, but she is a tartar. Take stock of her five long lancets, with a stylet like a hypodermic syringe needle. These are the things she drives into you when she bites. Figs. 9, 10 & 12.

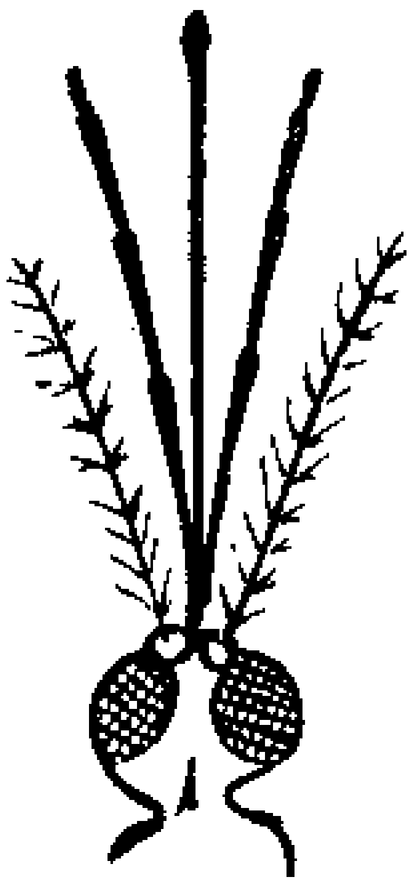
FIG. 9.



PROBOSCIS OF MALE.

The various parts projecting from the head are numerous and complicated. We will divide them into two sets—those of the proboscis, which take part in biting or sucking, and those which we will consider partly ornamental. The latter are the two plumed antennæ—so different in the male and female—and the two maxillary palpi. These palpi in the male are enlarged at their extremities, and are thus readily visible. *See* Fig. 9.

FIG. 10.



PROBOSCIS OF FEMALE.

The proboscis consists of numerous parts. These we may also divide into two sets—those which penetrate the skin when biting, and those which, though assisting in the act, do not penetrate. By attention to the diagram these various parts will be readily distinguished. Fig. 12.

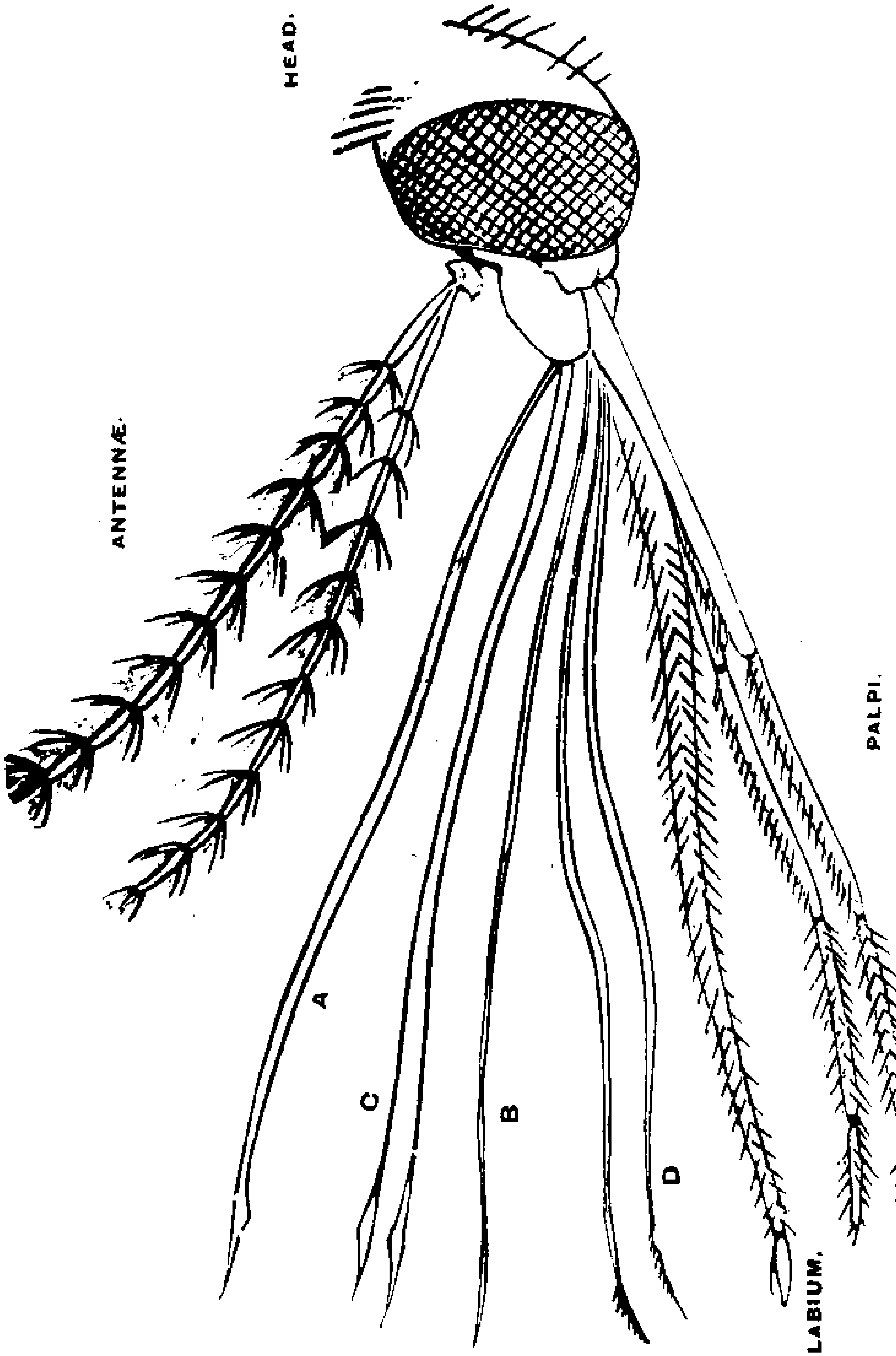


FIG. 12

MOUTH PARTS OF FEMALE MOSQUITOS.

a. The Labrum.
b. The Hypopharynx.
c. The 2 Mandibles.
d. The 2 Maxillæ.

The above six parts are approximated together in the act of biting and constitute the penetrating organ—the **Labium** supporting them.

The parts of the proboscis which penetrate are:—

a. On top the labrum—a medium organ grooved on its under surface.
b. Below this the hypopharynx—a long hollow pointed needle.
c. Below this again the two mandibles—needle-like processes. These are absent in the male.
d. And the two maxillæ—rod-like processes, barbed at their ends.

There are therefore six structures taking part in the organ of penetration. Beneath all these is the single thick fleshy "LABIUM," grooved on its upper surface, and in the groove of which the biting parts lie when at rest. This labium is the part of the proboscis which does not penetrate the skin when the insect bites. The term proboscis includes therefore the above seven structures.

Your attention is directed to still further details concerning these parts.

The labrum or uppermost part of the proboscis is in cross section like this ∩ and the approximation of the hypopharynx to it below thus converts it into a tube. The end of this labrum in the female comes to a fine point, but in the male is blunt. In the male also the groove is very narrow, and the hypopharynx is not free, as in the female, but is more or less fused with the labrum, thus converting it into a distinct tube.

Now it is along this tube, whether permanent in the male, or formed as occasion requires in the female, that food is drawn, the tube being continuous with the cavity of the mouth. The space therefore between the labrum above and the hypopharynx below can be considered as the space between the jaws leading to the mouth. Whether the food be blood, or the juices of plants, it has to pass along this tube.

The hypopharynx is in shape like a two-edged sword, flat on the top where it approximates to the labrum, but convex below. A tube of extreme fineness (·035 mm. in diameter) runs down it and opens at its extremity. It is through this fine duct that saliva and poison are projected. In the male the hypopharynx is fused with the labrum, and although traversed by the fine duct, is not a piercing organ. You will remember that the labrum is blunt at the extremity in the male, and for this reason, and the absence of mandibles, the male insect does not bite like the female.

The Mandibles only exist in the female. They are long narrow chitinous blades with flattened knife-like ends, the cutting edges of which have 31 extremely fine teeth.

The Maxillæ are extremely fine stylets, with one edge sharp like a razor. They are rather longer than the mandibles, and have at their extremities 13 teeth. These teeth are much more decided than those on the mandibles.

The Labium is a fleshy stalk forming the lowest item of the proboscis. It is grooved on the upper border, and at its extremity it possesses two lobes or lips. When at rest the other parts of the proboscis lie in this groove. This fleshy stalk does not penetrate the skin, but in the act of biting the terminal lips or piercing organ much in the same way as the hand is used to guide the billiard cue in billiards, and the lips rest on the point where the stylets enter and steady them.

This two-lobed extremity is also a feeling organ. The labium is covered with hairs, and within is a hollow. It is along this hollow that the embryos of a worm causing the disease known as Filariasis have been seen, but how they escape from this hollow and infect man is not known.

The Antennæ are segmented rods covered with hairs. They are bushy and feathery in the male, but comparatively smooth in the female. Sometimes the hairs lie flat, at others they are spread out. There are 16 segments in the male and 15 in the female.

The Maxillary Palpi are jointed rods. They are enlarged at their ends and bushy in the male, but plain in the female. In the female of one important genus of mosquito they are short, in the female of another important but less numerous kind of mosquito they are long.

Mosquitos of both sexes, when they feed, move the plumed antennæ and the palpi right out of the way. The males feed more slowly than the females, probably because the passage along the labrum and hypopharynx is, as mentioned above, much smaller. The opening in the head which constitutes the mouth leads to a pyriform cavity in the head, which is continued as a cylindrical tube through the neck into the thorax. Here it is dilated into a sort of

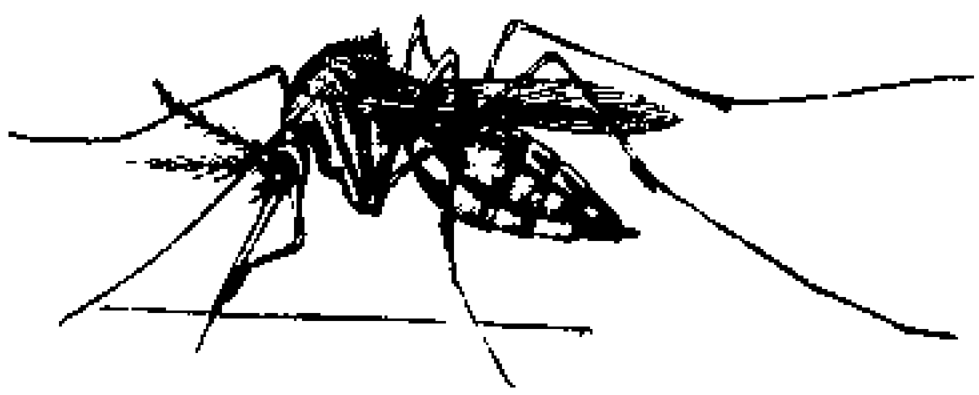
It is into this tube or gullet, while passing through the thorax, that the aspiratory vesicle opens. This is a large cavity containing air and having air tubes on its walls. In the thorax also are the four salivary and two poison glands. The ducts from these glands join together and form a single tube, which, passing through the head, opens into the base of the hypopharynx.

Now what happens when the little vixen bites is this. The sharp central stylets, constituted of the upper lip, the hypopharynx, the two mandibles and the two maxillæ, are driven into the skin, and at the same time the poison from the glands is forced down the centre of the hypopharynx and injected.

If she does not draw blood through the puncture, she withdraws her stylets and tries elsewhere. The saliva and poison are injected, whether blood be drawn or not, as is evident from all points of puncture reacting by swelling and irritation. The poison passes down the fine tube of the hypopharynx while blood is drawn up the tube formed by the labrum and hypopharynx. The stylets may penetrate the skin almost their entire length, the labium supporting them being bent back like a bow. Fig. 13.

It is possible to watch this process with a pocket lens. Let one settle quietly on the back of your hand. You will see her fill herself with blood, and like the old lady in "Pickwick" she will swell "wisibly."

FIG 13.



THE FEMALE MOSQUITO IN THE ACT OF BITING.

While she is sucking, gently tighten the skin of your hand by clenching the fist, and you will find that she is caught and cannot withdraw her mandibles. You can then easily catch her.

Now it is not the actual bite which is painful, but the irritation of the injected poison. The use of this poison is not quite clear. It cannot be to attract more blood to the part, because the insect flies away immediately, or is very quickly driven off. You would rather think the painful bite a disadvantage—it is like a thief making a noise—and would suppose that the sucking of blood done quietly and unostentatiously would secure a larger meal. The most plausible explanation appears to be that the poison mixed with the blood prevents it clotting or setting, and that the blood thus kept fluid more readily serves its purpose when imbibed into the insect's body. Leeches, when biting, inject a fluid from their salivary glands, the function of which seems to be the prevention of the coagulation of the blood of the victim, and as they store up the blood in pouches opening from their stomach, and take a month or two to digest it in small amounts, as required, the advantage of non-coagulation is easily seen. Professor Lankester suggests that it is possible that in the case of mosquitos and other blood-sucking flies, they may use their salivary secretion for a similar purpose. It is obvious that unless there were some injection into the wound on the part of the fly, the chances of infection of the bitten animal by the parasites carried by mosquitos or tsetse fly would be but small. Ladies will please note that these vicious, poisonous mosquitos are all females. It is only the females who bite, and only the females who sting. The males are vegetarians, and it is only the females who have a taste for blood. A comparison of the proboscis of the male with that of the female clearly indicates that the male cannot bite, but must depend upon the sucking of the juices of plants for his sustenance. As already mentioned, the blunt end of the labrum, the fusion of the hypopharynx with the labrum, and the absence of mandibles, all indicate this.

We have still to refer to one or two other important organs. Note the two large compound eyes occupying so large a position in the head. Mosquitos have a brain, and nervous ganglia, and nerves. Respiration takes place, not by lungs, but by air tubes leading from openings along the sides of the body and distributed in tufted branches to the organs. The aspiratory vesicle in the chest is also connected with respiration. The circulatory apparatus is represented by a tube running down the back of the thorax and abdomen, which, by worm-like contractions, keeps the juices of the body in movement. There is no separate blood, and there are no blood vessels, all the organs being bathed in the juices of the body cavity.

The stomach of the mosquito is a dilated portion of the alimentary tube, and leads into the bowel. The generative organs are situated in the hinder part of the abdomen.

Having now briefly considered the structure and life history of mosquitos, we must refer to their habits

The staple fare of both sexes is the juices of vegetables; but, when available, the female loses no opportunity of taking her meal of blood. Birds and animals are bitten, as well as man.

Mosquitos can be kept alive in captivity on the juice of the banana, and will thus live for at least eight weeks. The desire for blood seems so strong that mosquitos will even bite a human corpse (Christy). This is an observation of considerable importance, because in cases of malaria or blackwater fever a corpse may be a distinct source of danger. In temperate climates it is only during the hot weather that mosquitos show any tendency to attack human beings. In the tropics, however, they may prove troublesome all the year round.

How long mosquitos live in their natural state is not known. It is probable that they live in dark corners for long periods, and that they hybernate during winter. It is said that the larvæ of some species hybernate, under favourable conditions, for as long as 6—8 months. The presumption is reasonable that mosquitos possess the power of hybernation either in the larva or pupa stage, or in both, otherwise in cold and very dry climates they would not survive from one season to another. As they regularly appear in cold countries, such as Norway, and in almost rainless districts, it is to be supposed that they do not all become extinguished.

For breeding purposes, as you have seen, water is necessary, so that mosquitos are more common in wet and marshy places. Generally speaking, they are nocturnal in their habits, that is to say, they like the light, as in a dense forest, they are common enough in the day. Otherwise they sleep during the day in shady places, quiet nooks, under foliage, beneath the eaves and roofs of houses, or in the folds of clothes.

As you know, some of them make a buzzing or humming noise. This differs with the sex and with the species. It is supposed to be produced in two ways. The deeper notes, forming the droning sound, are due to the rapid vibration of the wings, which has been calculated by an instrument for measuring sound to amount to about 3,000 a minute. The higher and shriller notes are due to special stridulating organs situated on the openings of the air tubes at each side of the body.

These openings are arranged in rows on each side of the body, and the air tubes form branches from these points to be distributed amongst the muscles and other organs of the body.

It is supposed that this music serves as a means of serenading the male mosquitos, for the hairs on the antennæ or whiskers of the males vibrate in unison. As Grant Allen says: "We may reasonably conclude that the female sings in order to please and attract her wandering mate, and that the antennæ of the male are organs of hearing which catch and respond to the buzzing music she pours forth for her lover's ears." This view is confirmed by the fact that the sounds given off by some electric arc lamps have been known to attract only male mosquitos.

It was reported in the *Lancet* that when an electrical engineer was engaged on some experimental work on harmonic telegraphy, he found that when the note given out by the instrument was raised to a certain pitch, all the mosquitos, both those inside and those immediately outside the room, crowded together near the apparatus. The ingenious engineer converted the apparatus into a fly-catching machine by covering it with fly-paper, and having attracted and captured the insects, proceeded to electrocute them. Sir Hiram S. Maxim also narrates that while erecting an electric light apparatus, one of the lamps, which was of a somewhat peculiar type, gave off a constant musical note. One evening, on examining this lamp, he found that everything in the immediate vicinity of the box below the globe which was emitting the sound was covered with mosquitos. An examination led to the discovery that all were males, and this in spite of the fact that there was in the neighbourhood an enormous preponderance of females. When the lamps were started at the beginning of the evening, every male mosquito would at once turn in the direction of the lamp. and, as it were, face the music, and then fly off in the direction from which the sound proceeded. That the male mistook the buzzing of the instrument for the buzzing of the female is probable, seeing that the notes emitted were practically identical. Here, then, is a new phase of sexual selection, which is likely, in the hands of the electrician, to lead rather to the extinction than the perpetuation of the species. Sir Hiram Maxim suggests an interesting experiment. "If," he says, "you obtain a tuning-fork which emits a note as near to that of a female mosquito as possible, and strike this fork within 20 feet of a male mosquito, he will at once turn about, face the music, and erect the two little feathers of his head, something after the manner of a cockatoo."

Persons are more liable to be bitten when engaged in conversation than when silent. A stringed instrument has a great attraction for mosquitos. These insects are also greatly influenced by colour. Dark blue and violet are much preferred to yellow and red, and they will hang about dark garments much more freely than on light-coloured ones.

It may not be uninteresting to record that even mosquitos have parasites which feed on them. These parasites are of course very minute, but they are nevertheless highly organised animals. The well-known saying that big fleas have litte fleas to bite them is here well exemplified. Two parasites have been recorded—one a mite or tick, and the other a fly. The mite or tick is a tiny insect, in length only ·5mm., which fastens itself on to the body of the mosquito and sucks the juices from its body, and even animal blood from its stomach. They have been seen as bright red points when they have been successful in penetrating to the mosquito's stomach and sucking some of its injested blood, and as pale-coloured bodies when the juices of the mosquito's body have only been obtainable. These tiny insect parasites have six legs terminating in claws, and their skin is covered with spots. The other parasite is a minute fly which fixes itself to the under surface of the mosquito. It is still smaller than the other parasite, being only ·2mm. in length, and can scarcely be distinguished from the mosquito itself, from being of the same colour. It also manages to suck, not only the body juices of the mosquito, but blood from the mosquito's stomach.

The natural enemies of adult mosquitos are lizards and spiders, and probably many larger insects, and also bats. The larvæ are destroyed wholesale by small fish, and probably by frogs.

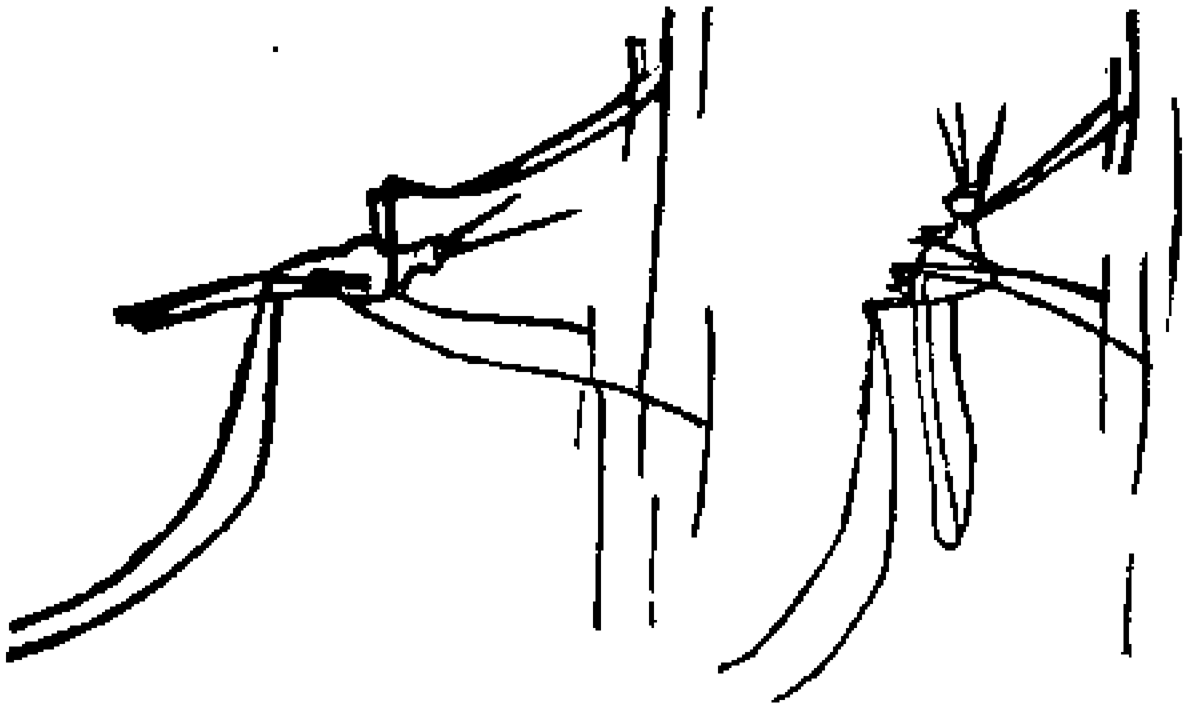
CHAPTER III.

THE TWO CHIEF SPECIES OF MOSQUITO, "CULEX" AND "ANOPHELES."

We are now in a position to consider the characters of some of the different species of mosquito. There are several hundred different kinds of mosquito, but for our purposes it will be sufficient if I describe two—the common "Culex" and the "Anopheles." Of the Culex genus there are a very large number of species, but of the Anopheles genus at present about 30 to 40 species are known. The Culex in some of its varieties is world-wide, and so common that it must be familiar to you all. The Anopheles genus is of interest in consequence of its connection with Malaria. The term Anopheles signifies troublesome or hurtful—an epithet which has been well earned. Fortunately you do not require to be a trained specialist to distinguish these two varieties.

The mosquitos commonly described as grey or "brindled" belong to the Culex genus—the so-called "dapple-winged" to the Anopheles genus. The common Culex, when resting on a wall, has its body parallel with the wall, and its proboscis bent downwards or tucked in, and the hind legs can be the back. Fig. 14. On closer inspection the wings will be seen to be mostly of a plain brown or grey colour. Anopheles, on the other hand, rests on the wall with the body sticking out at an angle, and the proboscis is directed straight forward in a line with the body. It is altogether more slender, has a smaller head, and thinner and longer legs. The wings, moreover, show dark blotches along their front margins. An important distinction between the females is in the palpi or feelers. These in Culex are very short, but in Anopheles are as long as the proboscis.

FIG. 14.

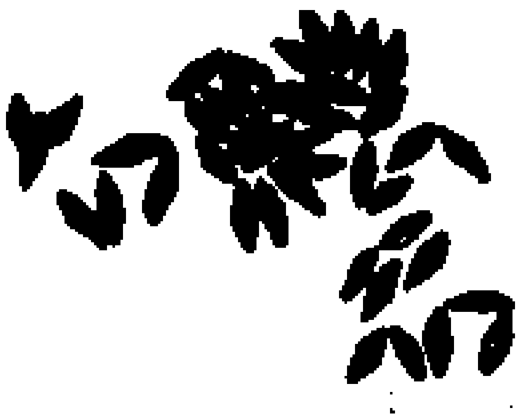


ANOPHELES. CULEX.

Attitude assumed when resting on the wall.

These two genera are distinguished in their youth as in their adult age. The eggs of Culex, as I have described to you, are laid in the form of a boat or raft, and can be recognised floating about like specks of dirt. The egg of Anopheles are laid singly or else in batches of twos and threes. Fig. 15. The eggs of Anopheles are boat-shaped, and they may number from 40—100 at a laying. Different species of Anopheles lay their eggs on the water differently, some in groups, others side by

FIG. 15.

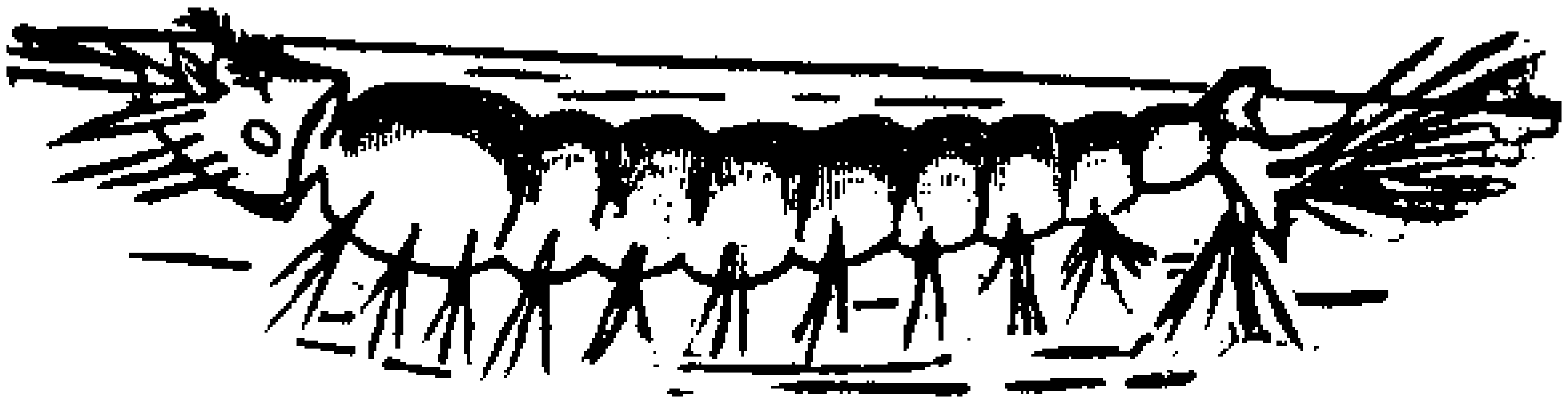


EGGS OF ANOPHELES.

side, like a bridge of boats, and others in starlike patterns. Culex eggs adhere together in one mass—Anopheles do not, and are therefore more scattered about by the wind.

The larvæ of Culex, when at the surface breathing, hang head downwards—those of Anopheles lie horizontally. Fig. 16.

FIG. 16



LARVA OF ANOPHELES.
At surface of water

The latter lie just under the surface of the water, with the ventral surface of the body uppermost, and they may be said to lie on their backs. They are mostly surface feeders, and though, when disturbed, they jerk backwards out of the way, they more readily come to the surface again than the Culex variety. They may remain "below" ½ minute or more, even as long as 25 minutes.

In Culex the breathing tube stands up from the back of the eighth abdominal segment. In Anopheles breathing takes place by two openings flush with the surface, which lead into the internal air tubes. The Culex larvæ have large heads which are supposed to weigh them down, so that they take up a vertical position when breathing, with the tail uppermost. They seem to be more easily frightened than Anopheles. Culex "wrigglers" so common in many ponds. Anopheles move about by jerks in a backward direction.

When disturbed Anopheles larvæ wriggle tail first towards the bottom, and move tail first when coming back again.

The larvæ of Culex may be found in almost every pot, tub, pond, or ditch, and will live in dirty foul water. "Culex larvæ may be found in abundance in almost any collection of water that has remained for some days on the ground, or in a tin, or tub, or gumlah, or tank ; in the few drops of water which collect at the base of the leaves of trees in a wood to the largest tank or irrigated rice field ; in the smallest and dirtiest puddles by the road-side, or in the eddies and backwaters of a mountain stream ; in the foul water of a cess-pool, or in the clear rain, or well-water kept in an iron tank, or fire bucket ; in broken chatties, old bottles, in anything in fact where a few ounces of water can lodge, Culex larvæ may be found" (James). Anopheles almost exclusively inhabit clear puddles or small ponds, more especially where green water weeds grow.

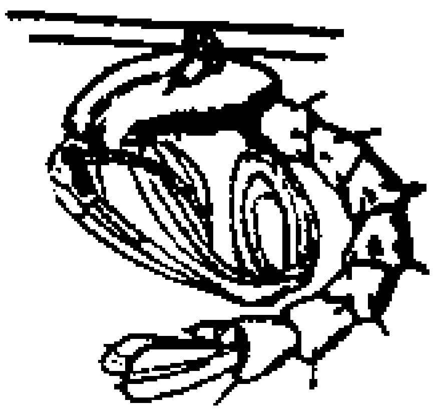
The larvæ feed on the spores of algæ, or diatomes and other organisms, and also on decaying leaves. They devour their dead fellows, and the dead bodies of drowned mature mosquitos. The Culex variety often feeds at the bottom.

Anopheles larvæ can be found in ponds containing fish, although small fish are their natural enemies, because they hide under the leaves of water plants.

generally green in colour, their skins being transparent. They may be found in ponds, ditches and streams, and many other more or less permanent collections of water, but they do not like sewage or foul water. The pupal stage is very much the same in the two genera, but the Culex pupa assumes a more upright position in the water, and the respiratory trumpets are not so broad as in Anopheles.

In their habits and customs the perfect insects also differ. Culex makes a buzzing noise, often of a high pitch, while Anopheles is said to be quiet, or comparatively so. Culex gives a painful bite, whereas Anopheles generally bites without attracting attention. Anopheles is much more active and difficult to see when on the wing, and can pass through much smaller meshes of netting than the ordinary Culex. These are points of some importance, because a careless observer, getting an attack of malarial fever, might easily suppose that mosquitos had had nothing to do with it—not having been aware he had been bitten by them.

FIG. 17.



PUPA OF ANOPHELES.

Table of Comparison of the two genera.

CULEX.	ANOPHELES.
Egg.	
Float in black masses, shaped like a boat.	Float singly or in small groups.

CULEX.	ANOPHELES.
Larva.	
Float head downwards.	Float horizontally.
Breathe from projecting tube.	Breathe from opening in body surface.
Wriggles irregularly when disturbed, but with the head foremost.	Jerks backwards on movement.
Head the same colour as the body and large.	Head black and comparatively small.
Pupa.	
Generally larger and assumes a more upright position in the water.	Respiratory trumpets broader.
Perfect insect.	
More "thick-set" in general build.	Smaller body and longer legs.
Palpi in female much shorter than proboscis.	Palpi in female the same length as proboscis.
Rests on wall with the body parallel to it.	Rests on wall with body stuck out at a marked angle.
Head carried, bent, looks hump-backed.	Head carried straight, in line with the body.
Proboscis curved, and carried at an angle with the head.	Proboscis straight, and carried in line with the head.
Green, brown or greenish-black wings, seldom marked.	Very light or dark brown wings, generally have dark spots along front margin

CULEX.	ANOPHELES.
Sings, or is noisy.	Is quiet.
Bite painful.	Bite hardly felt.
Habits.	
Larvæ to be found in almost any collection of water, clean or foul.	Larvæ most frequently in fairly clean water with a strong preference for water having green weeds.

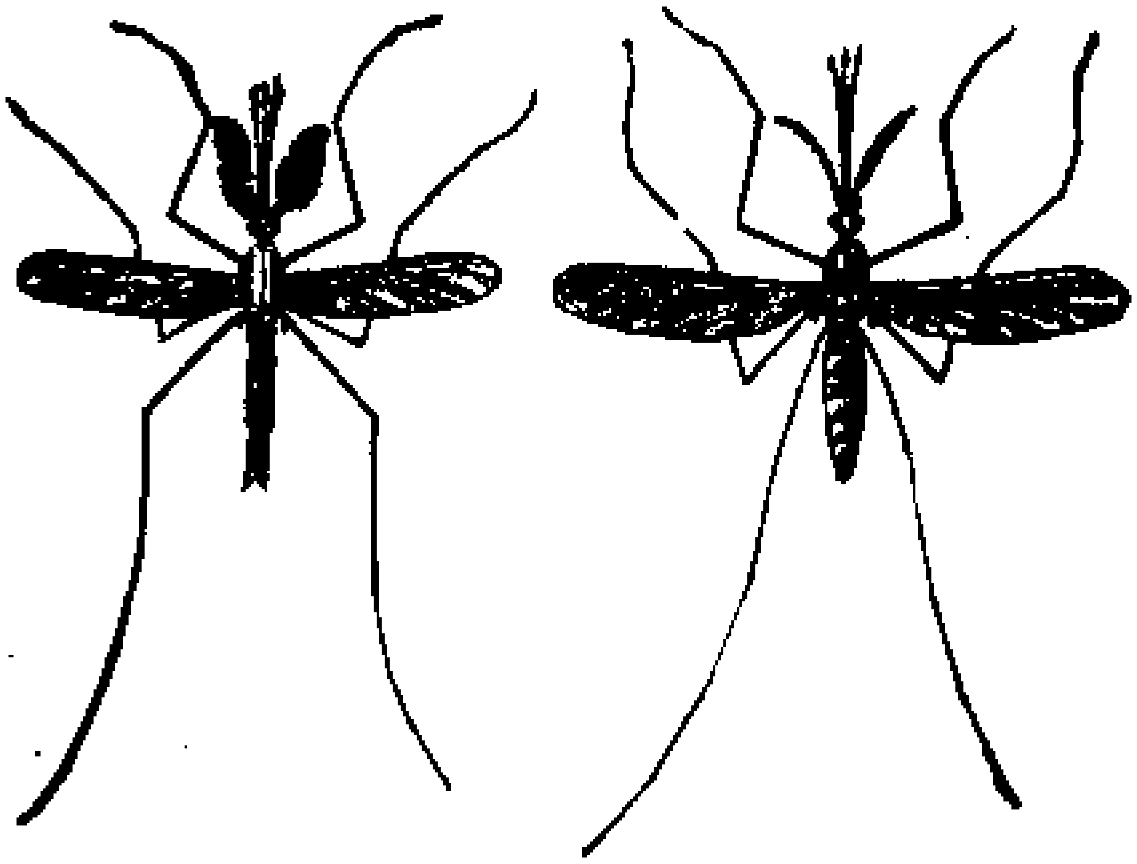
As the Anopheles genus is the only one, so far as is at present known, which is connected with human malaria, I shall for the rest of my narrative refer to it alone. Let me remind you of its chief characters. It is slender in body, and has long thin legs. It is very active, and with difficulty seen on the wing, but when at rest on the wall it sticks the body out at an angle of 45 degrees or more. Its head, proboscis and body are in one straight line, the wings have three or four dark spots along the front margins, and the palpi are as long as the proboscis. It doesn't make a noise, and its bite is not painful.

You can recognize the larvæ in ponds by their floating horizontally along the surface, by their peculiar backward jerking movements, by their black heads, and by their prevalence in puddles and ponds containing green weeds.

A further point of distinction is that Anopheles do not fly far from their breeding grounds, so that when they are found in houses, it is pretty certain their breeding

To distinguish male from female mosquitos is comparatively easy. In the male the antennæ or feelers are covered with hairs forming tufts or feathers. In the female the antennæ are nearly bare. The latter may have the abdomen distended with eggs, or the stomach may contain blood. Fig. 18.

FIG. 18.



MALE FEMALE

ANOPHELES.

CHAPTER IV.

MALARIA AND THE RELATION OF THE MOSQUITO THERETO.

I have now to relate one of the fairy tales of Science, but will first remind you that Malaria or Ague is the name of a frequently fatal disease, occurring principally in tropical climates, and characterized by periodic attacks of fever. It is acquired in certain localities only, and it is never communicated directly from person to person. We shall see presently how the disease is spread.

About 20 years ago a physician, who examined the blood of a malarious patient, discovered peculiar little bodies inside the blood corpuscles. You all know that the blood is composed of a fluid with thickly crowded round disc-like bodies floating in it. These are the corpuscles. The minute objects to be seen in the corpuscles have since been studied very carefully, and they are found to vary according to the type of fever and the stage of the attack. These minute bodies are the parasites of malaria fever.

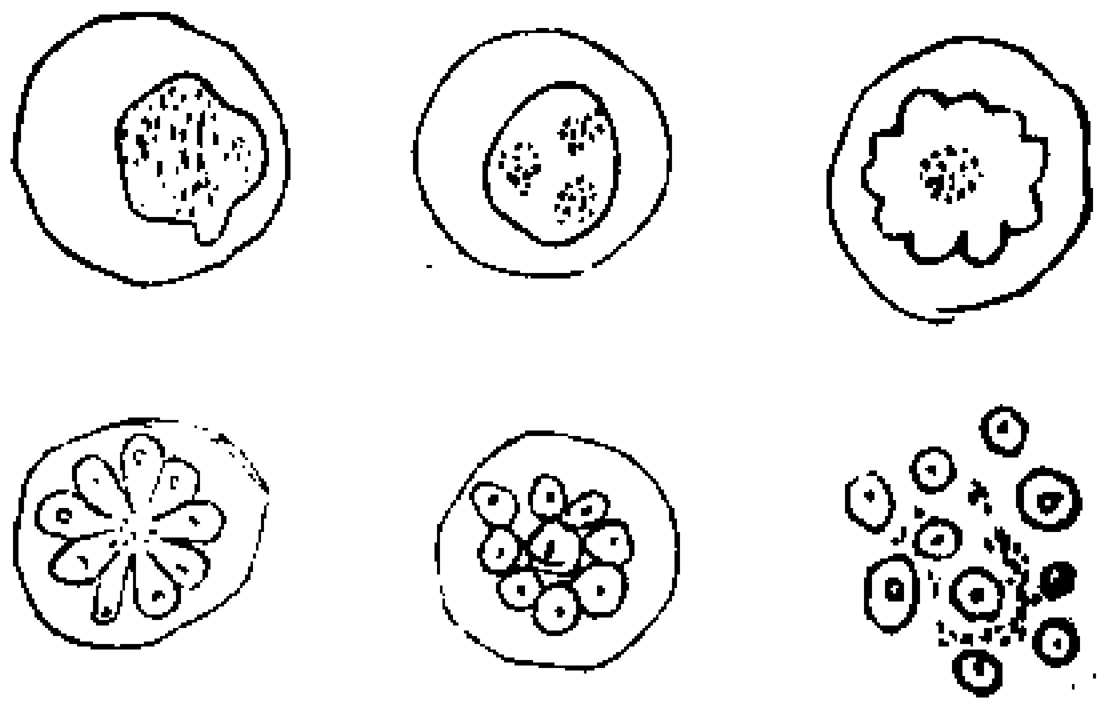
The reasons for this belief are—

1. The occurrence of the parasite in the blood is sooner or later associated with the symptoms of malaria.
2. An attack of malaria is associated with the presence of the parasite.

3. The stages of an attack of malaria are associated with phases in the life cycle of the parasite.
4. Injection of blood containing the parasite from a case of malaria into the veins of a healthy person will generally be followed by an attack of malarial fever.
5. Quinine, which ameliorates an attack of malarial fever, causes a disappearance from, or diminution of the parasite in, the blood.

Shortly before an attack of malarial fever this parasite may be seen as a pale circular patch within some of the corpuscles. At first it is clear and undergoes movements. Later it acquires a dark pigment and the movements slow down. In the next stage the pigment will be seen to have arranged itself into two or three blocks, and the parasite will have assumed a rosette sort of appearance. The segments, like the "quarters" of an orange, then change into small round spores, and soon afterwards the blood corpuscle breaks up. Fig. 19.

FIG. 19.



THE PARASITE OF MALARIA.
ONE VARIETY.

The corpuscle is completely destroyed.

The spores and loose particles of pigment are cast free into the blood stream.

The commencement of the fever paroxysm coincides with the breaking up of this rosette body, and the liberation of the spores in the blood fluid.

The spores attach themselves to fresh blood corpuscles, get inside them, and the parasite goes through the same series of changes again. The pigment becomes deposited in the organs of the body. According to the type of fever, this cycle of change may occupy 48 or 72 hours. You can readily understand that by this frequently repeated process large numbers of the red corpuscles of the blood are destroyed, and this explains the pale, bloodless appearance of many malarial subjects.

The pigment is formed by the parasite from the colouring matter of the blood corpuscles.

The parasite has another form of existence, otherwise it would die out with its host and be exterminated. It leaves the human body, passes a short period outside the human body, and then enters the human body again. How does it do this? Through the medium of the mosquito.

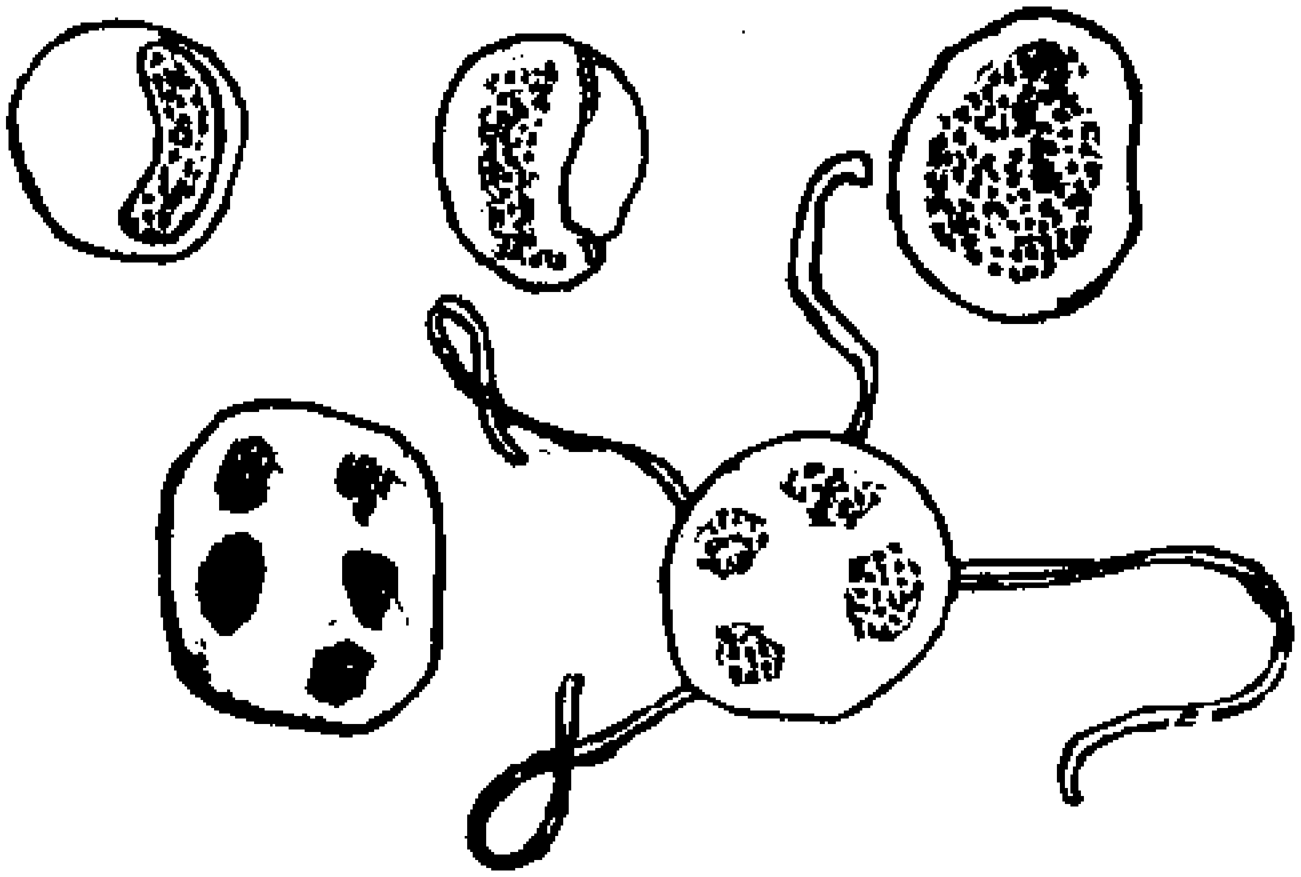
The reasons for this statement are—

1. That after certain species of mosquito have imbibed blood from a malarial subject harbouring the parasite, the parasite can be followed in its development in the tissues of the mosquito.
2. That mosquitos thus infected with the parasite of malaria can infect healthy persons

The discovery of this has only been achieved within the past few years. The theory was formulated by Manson in England, but the actual discovery was made by Ross in India.

In addition to the minute bodies in the blood corpuscles which I just now described to you, and which by their periodic cycle of changes bring about the corresponding periodicity of symptoms in malaria fever, there are other forms of the parasite to be found in the blood. These also are to be seen in the blood corpuscles, but appear either as large pigmented spheres or as crescent-shaped bodies. Fig. 20.

FIG. 20.



THE PARASITE OF MALARIA, SECOND VARIETY.

Note the bodies with whip-like protrusions. These have not been found in the blood directly examined after being taken from the body, but they develop in it a little while after it has been drawn. They are sexual forms of the parasite. Like the crescent-shaped bodies, they do not go through the changes of rosette bodies and globular spores with breaking up of the enclosing corpuscles. Their rôle is different. They represent stomach of the mosquito in order to attain full development. It is probable that some of the parasites first described may develop into these pigmented spheres and crescents, but these latter, once formed, do not undergo further changes of development in the blood.

The severer types of fever are generally associated with the crescent-shaped bodies, and the milder types with the rosette bodies. After an attack of fever parasites may not be discoverable in the blood. It is believed that they pass a "latent phase" in the spleen, bone, marrow, or other deeper organs in the body. They may remain quiescent perhaps for many months, until some influence, not clearly understood, brings them into activity, when they give rise to another attack, or to a series of attacks of fever. Sometimes a chill, at others exposure to the sun is thought to bring back an attack of the old fever.

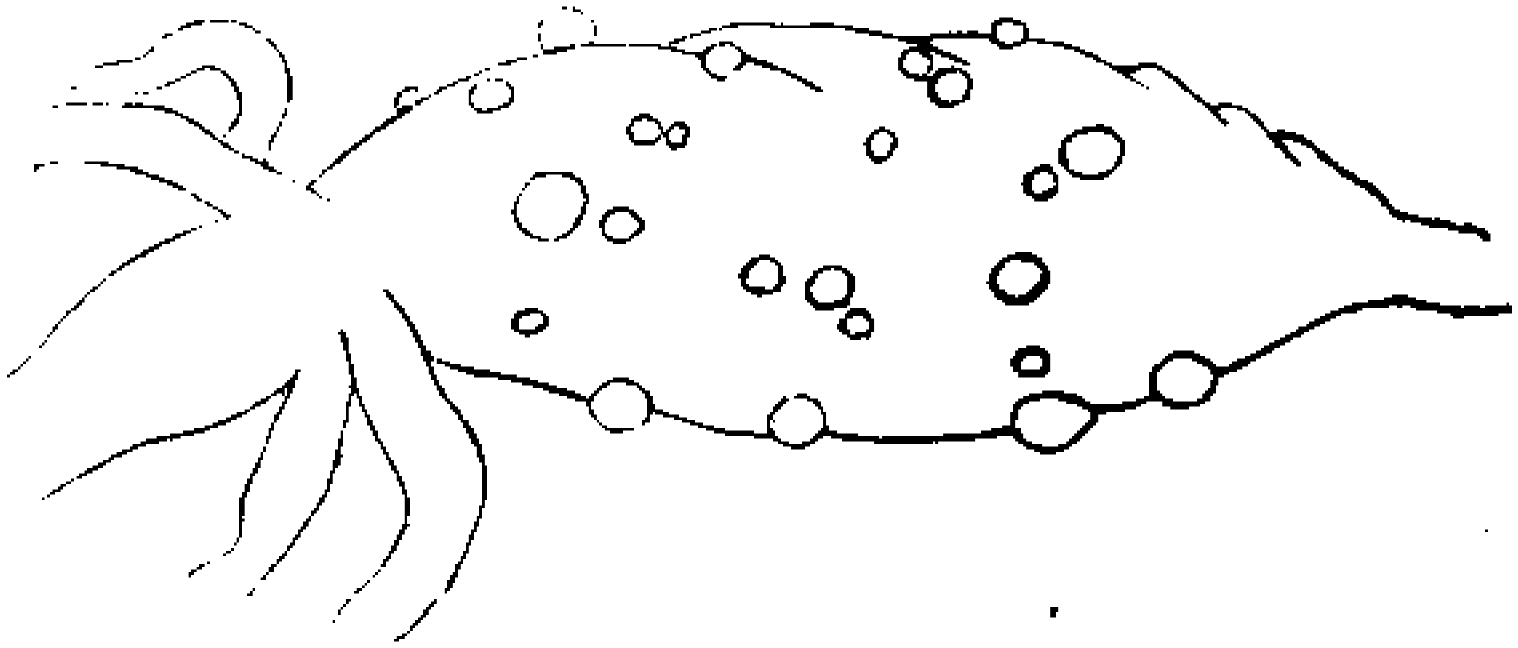
It has long been known that many parasites require two hosts for their complete development. A familiar example is the common tape-worm, which passes one stage of its existence in the flesh of swine, and then man, through eating this infected flesh, becomes the host for its further development into the form of a worm. Another example is the Trichina spiralis giving rise to "Measly" pork, and a third example is the Filaria which causes Elephantiasis.

Texas cattle fever and the Tsetse-fly disease are also caused by the bites of insects.

The parasite of malaria passes the one stage I have stage, which I will now describe to you, in the body of the mosquito.

When the mosquito bites and sucks blood from a malarious patient, some of the infected blood corpuscles are received into the mosquito's stomach. Here the parasite undergoes a change. The pigmented sphere escapes from the enclosing blood corpuscle, and is changed into an almond-shaped body with a pointed end, which by its power of movement makes its way into the walls of the stomach. After a day or two in this position, the parasite can be recognized in the stomach wall as a pigmented cell. This increases in size, and gradually protrudes (like a wart on the finger) into the general body cavity of the insect. Fig. 21. A little later there can be seen in these protruberances delicate thread-like bodies packed closely together. At the end of about a week the cyst-like protruberances burst, and the tiny pointed thread-like bodies are poured into the juices of the general body of the insect. Some of these find their way to the salivary and poison glands situa-

FIG. 21.



THE PARASITIC PROTRUBERANCES ON THE WALL OF THE STOMACH.

duct runs up to the proboscis. When the infected mosquito then bites a fresh healthy person, she pours the secretion from these glands into the skin, and with the poison is injected some of these minute thread-like bodies. These latter are absorbed from the skin into the blood, and some of them, entering the blood corpuscles, start again a fresh cycle in the life of the parasite.

The minute organism—the cause of malaria—is placed by zoologists in the group Protozoa, and it is one of the smallest of the group known. English observers classify the malaria parasite of man with those of birds into a separate group from the others. These are known technically as the "Hæmamœbidœ," and the group is further subdivided for the different species corresponding with the different types of fever.

This malarial parasite may almost be described as the microscopic wonder of the day. When first seen in the blood corpuscle it measures about 1/8,000 part of an inch across, and though in its subsequent stages it is much larger, the final thread-like bodies which are injected into the blood, and renew its life again, are extremely small.

You may imagine that I have been really telling a fairy tale, and that these facts cannot be known. I assure you that these facts have been discovered by careful observation and painstaking experiment. The final proof of the conveyance of malaria by mosquitos was proved in the following way. Mosquitos free from disease were reared from larvæ. After these larvæ had developed into perfect insects, they were allowed to bite a patient in Italy suffering from a particular variety of malaria, in which the parasite is clearly distinguishable and characteristic. The mosquitos thus infected were then carefully taken to England, and a young doctor there, in the interests of science, permitted himself to be bitten by these infected mosquitos. In course of time he developed an attack of malaria, not only identical in character with that of the patient in Italy, but he had parasites in his blood identical with those of the patient in Italy. This experiment has been since confirmed.

In the "Tertian" or alternate-day variety of ague, symptoms commence about fourteen days after being bitten.

I must now remind you, in case you get hold of a wrong impression, that it is not all forms of mosquitos which are the carriers of the malarial parasite. As far as we know, it is only the Anopheles genus which is culpable, and probably even not all the species of this genus.

Moreover, the Anopheles mosquito cannot transmit malaria unless she happens to have sucked blood from a malarial subject.

We may summarize these results as follows. Man and mosquitos are required for malarial infection, which passes from man to mosquito, and from mosquito to man. As far as we know at present, the malaria to which man is subject can only be transferred from man to man by means of the mosquito. Other animals than man are subject to similar parasites, and they malaria are not known to be transmissible to man, and the parasites, moreover, are dissimilar. Birds, monkeys, bats, dogs, sheep, horses, and oxen, each have their parasites, and each their form of disease. It is possible that each is perfectly distinct, and only transmissible to its kind.

It is probable, however, that the malaria of some animals, *e.g.*, that of the bat, may be transmissible to man; otherwise we have a difficulty in explaining the malarious character of certain very thinly peopled districts, and of the rapid spread of so-called malarial epidemics. As far as we know, one mosquito cannot infect another.

You will see therefore that where malaria abounds it is absolutely necessary that there should be mosquitos. It does not follow, however, that every place where mosquitos are found is malarious.

The extinction of ague in Great Britain did not depend upon the extinction of mosquitos capable of harbouring the parasites of malaria. There are at the present day three species of Anopheles still to be found in Great Britain in all the districts which were formerly malarious. At the present time, however, indigenous ague, that is, ague caught in the country, is almost unknown. The prevalence of ague is probably more a matter of numerical distribution of Anopheles, and we do not quite know what determines this.

The old observations about malaria are easily explained on the mosquito theory. Its association with being out at night in certain places, the salubrity of high places and upper storeys compared with low-lying land and ground floors, the value of the mosquito net, of smoke, and of fire, and the diminution of malaria during the cold season, are all explainable on the theory of the mosquito as the carrier of the parasite.

We do not know why one species of mosquito should be prevalent in one place and not in another. Some localities favour Culex, others Anopheles. Some species of Anopheles mosquito are prevalent in Italy, others in East Africa, and others again in India. What we do know is that a high atmospheric temperature, collections of water, not disturbed by winds or currents, and which do not dry up within the period of the life history of the mosquito, and which contain low forms of animal and vegetable life, are the conditions for the multiplication of malarial-carrying mosquitos.

The rapid growth of water weeds, which sometimes cover the surface of the water thickly and completely, is often attended by the disappearance of larvæ from a pond, and as such a growth may take place several times in a year, certain localities may have their seasons for Anopheles, as well as seasons free of them. The number of Anopheles are well known to vary at different times of the year even in the tropics, and it may probably be that this fluctuation depends either on such a growth in the ponds, or on the varying prevalence of some of their natural enemies.

CHAPTER V.

THE DESTRUCTION OF MOSQUITOS AND THE PREVENTION OF MALARIA.

You will have recognized that malaria must now be classed as one of the contagious diseases. A person suffering from malaria is a danger to his neighbour, because if bitten by a female of the Anopheles species, he may have his disease conveyed to his neighbour. In certain districts a very large proportion of the population—especially of the children—are the subjects of malaria. In these districts, it will be found that the surroundings are particularly favourable to the life of the mosquito, and that the Anopheles mosquito abounds. A healthy new-comer, taking no precautions, is exceedingly liable to be attacked. On the other hand, a place might be marshy and yet not be malarious, either because there were no Anopheles mosquitos, or because there were no infected people to supply the parasite. You see therefore that a place to be malarious must be, firstly, where the local conditions afford good breeding grounds for the Anopheles species of mosquito, and, secondly, where human beings, already the subjects of malaria, exist.

As this is a popular scientific essay, and not a medical one, I have omitted very many matters, not only like you to understand, however, that each of the several kinds of malarial fever has its distinctive parasite, which goes through its own particular phases in the blood, and is recognizable from the others. A few years ago malarial fevers could only be classed according to the symptoms which patients suffered. To-day we differentiate them by the particular parasite accompanying the fever, and where symptoms fail to give us a clue, the parasite tells us what is the difference. It remains for me to tell you what is being done in the way of the prevention of malaria as the result of all these recent discoveries. We have no way at present of producing an artificial immunity to malaria. It is doubtful whether quinine possesses this power, although it has been largely given for the purpose. No one questions its value against malaria when once infected, but its internal administration is of doubtful value as a preventative. Methylene blue has been also extolled, but its value is equally doubtful. Some people are more sensitive than others, possibly because for some reason they more readily attract the bites of mosquitos. If we must live where malaria exists, we have therefore two methods to go upon—

1. To protect ourselves from being bitten.
2. Destroy all the mosquitos we can.

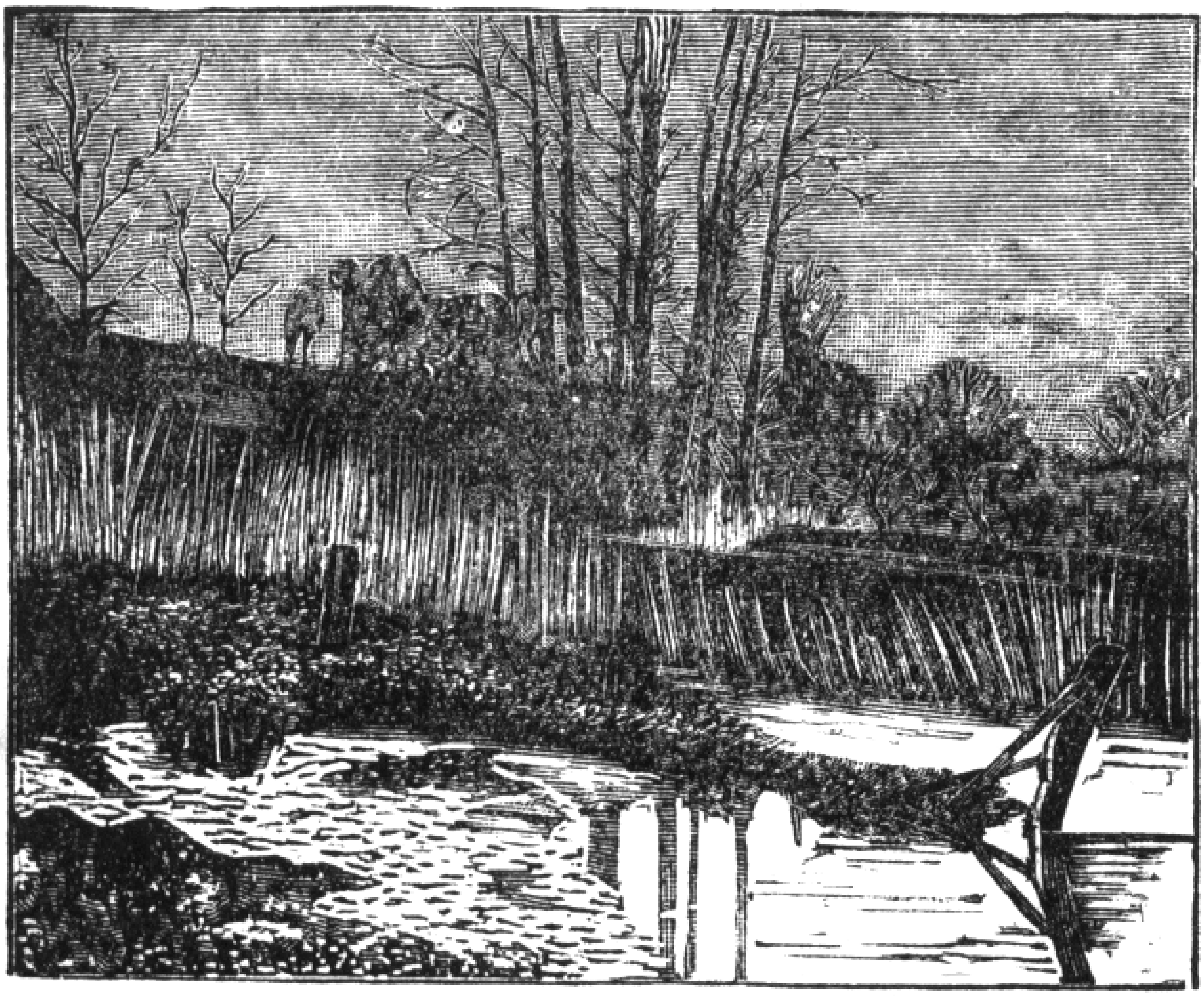
We can protect ourselves by not going out in dangerous localities after sunset, by sleeping under mosquito curtains, by not living close to quarters occupied by infected people, by not living in or close to places which afford breeding grounds for these insects, by selecting upper storeys and high ground rather than ground floors and low-lying places, and lastly by anointing our skins with substances disliked by mosquitos. If we must of necessity risk exposure to infection, such, for instance, as a march through a dangerous locality after dark, or a compulsory rest in a highly-infected neighbourhood, the only protection possible is to prevent mosquitos biting you by making your skin so objectionable to them that they won't come near you. Mosquitos detest the smell of certain essential oils, especially oil of lavender, but also oil of absinthium and American oil of pennyroyal; they also dislike turpentine, sulphur, menthol, nutmeg, camphor, garlic and iodoform. The skin can be anointed with preparations containing one or more of these substances; but failing these, the fumes of tobacco, chrysanthemum flowers, fresh eucalyptus leaves, quassia wood, pyrethrum, powdered cineraria, or simple wood smoke are said to keep them off.

With chrysanthemum flowers the unexpanded blooms are to be used, and powdered cineraria may be mixed with nitre and ignited. In this form it is said to possess the power of killing all mosquitos in a room. As an application and for its fumes turpentine is perhaps the most useful agent.

The wholesale destruction of mosquitos in a district seems an impossibility. Perhaps their complete extermination is, but a very large reduction has already been effected in many places, with coincident diminution in the amount of malaria. The method adopted is to seek out all the spots which may be breeding grounds for Anopheles. This does not mean every pond, or puddle, or collection of water. Anopheles are not found in evanescent rain puddles, in puddles liable to be scoured out, in large pools containing minnows, in rapid streams, or in wells, cisterns, pots, or tubs, but are to be seen in slow running channels and stagnant pools containing green algæ or flocculent water weeds.

Although the Culex species will breed almost anywhere and everywhere, the Anopheles variety must be considered the essentially domestic species. Its breeding ponds are always close to the haunts of men. The females must pass frequently between the pools, where they lay their eggs, and the houses, where they can

FIG. 22.



A TYPICAL BREEDING POOL FOR ANOPHELES.

obtain their meals of blood. It may be laid down that if Anopheles are found in a house, there is a breeding pool not far off. In the morasses and swamps of uninhabited places the mosquitos are of the Culex genus, the females of which suck the blood of cattle, wild animals and birds. In deep tropical forests the mosquitos are chiefly of the genus Megarhina.

Malaria is probably never contracted in the depth of the jungle, unless it be near villages. No country in which malaria is prevalent is free from Anopheles, and we may probably lay down the statement that where Anopheles abound, there also will be found malaria.

Having discovered the breeding grounds, the larvæ can be destroyed, either by filling them up if small, or by draining them if large. Coating the surface of ponds with kerosine or petroleum has been very successful.

A very small quantity of this covers a very considerable area. The larvæ come to the surface to breathe, and the petroleum blocks up their air tubes, and they consequently die. Tar also is useful.

A small quantity put in a barrel and placed in the pond, soon diffuses itself over the surface. Some of the aniline dyes added to the water are very efficacious, and their effect is said to be more lasting.

All these methods, of course, spoil the water for drinking purposes. Other remedies have also been tried. Sulphurous acid is said to be effective, but lime, copper, iron, ammonia and mercury only act in large quantities. Condy's Fluid mixed with hydrochloric acid is also said to be useful. The disinfectants "formalin" and "lysol" are useless. The possible influence of lime on the soil of a malarious district is worth recording, as certain experiments in France would seem to show that lime added to the soil for agricultural purposes proved in some way useful in getting rid of malaria. Finally we may say that there is no evidence to prove that the drinking of water containing the eggs, larvæ, or pupæ of mosquitos will cause an attack of malaria. All the evidence up to the present proves the opposite.

Some of these methods may be available in one district, and others in another. I will mention an experiment made in Italy to illustrate their value. A small island, long known as highly malarious, and having many hundred square yards of stagnant water, was treated as follows:—The collections of water were kerosined once a fortnight. The windows of the huts and houses were protected by gauze, and the interiors were fumigated with the smoke of various substances. No fresh case of malaria occurred during the ensuing malaria season, although in previous seasons the number of fresh cases occurring on the island were numerous.

In other places the same satisfactory result has been accomplished.

This is but a brief sketch of the mosquito, of the parasite of malaria, and of the means at our disposal for the prevention of this disease. I have endeavoured to give the results of recent scientific research, and to illustrate the practical outcome of these investigations. The future is very hopeful, and it is a source of pride for us that so much of the work yet accomplished has been done by our own countrymen.

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Indigenous Drugs of India

BY

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PREFACE

The Indian and Colonial Addendum to the British Pharmacopœia 1898, came out in 1900. The present work contains a concise account of the chemical composition, physiological action and therapeutics of drugs, which have obtained official sanction for India.

Besides the special preparations of the drugs, which are official, it also indicates how the fresh plants or any parts thereof, can be administered medicinally, so that the practitioners can use them almost at no cost.

This handbook, is a compilation form various standard works, in a concise form, so that students and busy practitioners, may know all about the official indigenous drugs, at a glance and use them therapeutically.

Any suggestion or communication about the chemical composition, physiological action and therapeutics of these drugs, will be most thankfully received and inserted in the next edition.

ABBREVIATIONS OF THE INDIAN VERNACULARS

Beng.—Bengalee.
Bom.—Bombay.
Bur.—Burmese.
Car.—Carnatic.
Dec.—Deccaneese.
Gug.—Guzrati.
Hind.—Hindee.
Mar.—Marhattee.
Sans.—Sanskrit.
Sin.—Sinhalese.
Tam.—Tamil.
Tel.—Telegu.
Uria.—Uriya.

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(With their Indian Vernaculars)

1. Ben.—Babul, Babla (বাবলা) ; Lat.—Acacia Arabica ; Eng.—The babhul tree ; Sans.—वर्व्वूर, ववूल ; Hind.—वावुल ; Uria.—गुइड़ा ; Bom.—वाभूल, कलिकिकर, रीमकड़ि (Ramakati) ; Tel.—नल्लतुम्म, वलवंतुडु ; Tam.—करुवेलं ; Guz.—वावल । Page 1.

2. Ben.—Muktajhoori (মুক্তাঝুরি) ; Lat.—Acalypha Indica ; Eng.—Indian Acalypha ; Hind.—खोंक्लि, कुपी ; Uria.—इन्द्रमरिच ; Bom.—खोक्लि, कुपी ; Mar.—खाजति ; Tel.—हरितमञ्जिरि, मरुपिण्डि ; Tam.—कुप्पइमेनि (Kuppaimeni) ; Guz.—वञ्छिकान्त । Page 3.

3. Ben.—Bakas or Basak (বাকস) ; Lat.—Adhatoda ; Eng.—Adhatoda Vasaka ; Sans.—वासक, वासा ; Hind.—अरूषा ; Uria.—वासं ; Mar.—अरूषा, अड़ुलसा ; Car.—अड़ूसा, आड़सोगे ; Tel.—अड़सर ; Tam.—अधड़ोड़े ; Guz.—अड़ुसी (Aduso). Page 5.

4. Ben.—Chhatim (ছাতিম) ; Lat.—Alstonia scholaris ; Sans.—सप्तपर्ण ; Hind.—सातियान, छातियान् ; Uria—छातनिया ; Bom.—छातविन् ; Mar.—सातवणा ; Tel.—एड़ाकुल ; Car.—एल्लेलग ; Tam.—एझिलइप्पालइ (Ejhilaippalai). Page 6.

5. Ben.—Kalmegh (কালমেঘ) ; Lat.—Andrographis Paniculata ; Eng.—Kariyat ; Sans.—यवतिक्ता ; Hind.—महातिता क्रियात् (Kryat) ; Mar.—ओलेन क्रियात ; Tel.—नेलविमु ; Tam.—नीलविम्ब ; Guz.—क्रियात, किरियात । Page 9.

6. Ben.—Ishermool (ঈশেরমূল) ; Lat.—Aristolochia Indica ; Eng.—The Indian Birth-wort ; Sans.—अर्कमूला, Page 10.

सुनन्दा ; Hind.—ईश्वरमूल ; Bom.—सपसन (sapsan) Dec.—ईश्वरमूल ; Tel.—ईश्वरमेरु ; Tam.—इसुरमूली ; Guz.—अर्कमूल ।

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Page 14. 8. Ben.—Neem (নিম) ; Lat.—Azadirachta ; Eng.—The neem or margosa tree ; Sans.—निम्ब ; Hind.—निम् ; Mar.—निंबु ; Tel.—येपचेट्टु ; Tam.—वेपुम्मरम ; Car.—बेउ ; Guz.—लिम्ब ।

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Page 22. 10. Ben.—Daru-haridra (দারুহরিদ্রা) ; Lat.—Berberis Aristata, Berberis ; Eng.—Barberry ; Sans.—दार्व्वी ; Hind.—चित्रा, रसौत, दारुहल्दि ; Dec.—ज़रिस् ।

Page 26. 11. Ben.—Pan (পান) ; Lat.—Piper Betle ; Sans.—ताम्बूल ; Hind.—पान ; Bom.—पान ; Mar.—विड़ेचपान ; Tel.—नागवल्ली, तमलपाकु ; Tam.—वेट्टली ; Guz.—नागरवेल ।

Page 29. 12. Ben.—Palash (পলাশ) ; Lat.—Butea Frondosa : Eng.—Butea Gum, Bengal Kino ; Sans.—किंशुक, पलाश ; Hind.—ढाक, पलाश ; Uria.—पराशु ; Mar.—पलस ; Bom.—खाकरी, पलाश, खाकार ; Tel.—मोदुग, मोदुग ; Tam.—परशन्, परश ; Guz.—खाकरा ; Bur.—पाक, पौक (Pouk) ; Car.—मुत्तलु ।

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Car.—अर्क ; Tel.—जिल्लेडुचेट्टु ; Tam.—एरुक्कु ; Guz.—अकरो ; Bur.—मेयबेङ्ग (Mayobeng).

14. Ben.—Tamal (তমাল) Gamboge (গ্যাম্বোজ) ; Lat.—Garcinia morella ; Eng.—Gamboge ; Sans.—तमाल ; Hindi—तमाल, गोटागम्बा ; Mar.—तमाल ; Tel.—चिमलचिनि ; Tam.—मोक्की ; Bur.—थमेङ्गुट (Thamengut). Page 34.

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20. Ben.—Karpas (Kapash) (কাপাস) ; Lat.—Gossypium Herbacium ; Eng.—Cotton plant ; Sans.—कार्पास ; Mar.—रक्तकापसी ; Car.—हत्ति ; Tel.—पत्ति। Page 43.

21. Ben.—(ধাওয়া গাছ) ; Lat.—Anogeissus Latifolia.

Eng.—Indian gum; Sans.—धव:; Hind.—धाओया, धावा, धाओरा; Uria.—दहु, धबु; Mar.—धामोड़ा, धावड़ा; Guz.—दाब्रिया; Tam.—भिन्नियनग; Tel.—नाबिंचेट्टु, सिरिमानु; Car.—सिविवक; Singh.—Daowin.

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Page 58. 28. Ben.—Matkalai (মাটি কলাই, চিনের বাদাম); Lat.—

Arachis Hypogœa ; Eng.—ground nut ; Sans.—बुचनिक (Buchanaka) ; Hind.—मुङ्गफली ; Bom. & Mar.—भूइमुग ; Tel.—वेरूसनग ; Tam.—निलकड़ालय ; Guz.—भोयचेना ; Bur.—Mibé.

29. Ben.—Saraban (শরবান) ; Lat.—Andropogon citratus ; Eng.—Lemon grass ; the geranium grass ; Sans.—भूतृणम्, गन्धतृणम् ; Hind.—अगियाघास, रसघास, गन्धतृण ; Bom.—रोहिषे ; Mar.—सुगन्धिरोहिस ; Uria.—पालखरि ; Tel.—चिप्पगड्डि ; Car.—परिमलदर्गंजाणि ; Guz.—लिलिचा। Page 59.

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31. Ben.—Til (তিল) ; Lat.—Sesamum Indicum ; Sans.—तिल, तिलक ; Hind.—मिठातिल ; Mar.—तिल ; Car.—एलु ; Tel.—तुव्वुलु ; Tam.—वाल्लैय। Page 64.

32. Ben.—Katki (কট্‌কী) ; Lat.—Picrorhiza Kurroa ; Sans.—कटुकी, कटुरोहिणी ; Hind.—कुट्की ; Bom.—कालिकट्की ; Mar.—कट्की ; Dec.—कालिकट्की ; केदारकटुकी ; Tel.—कटुकरोगणि ; Tam.—कटुकुरोगणि ; Guz.—कडु। Page 64.

33. Podophylum ; Hind.—पापड़ि, भवनवक्र। Page 66.

34. Ben.—Bakam (বকম কাঠ) ; Lat.—Cæsalpinia Sappan ; Eng.—Sappan ; Sans.—पत्तङ्ग, रञ्जन, रक्तसार ; Hind.—पतङ्ग ; Uria—बक्मो ; Mar.—पत्ङ्ग ; Tel.—मोकमुकट्टु, बकमु ; Tam.—वट्टङ्गी ; Guz.—बकम् ; Bur.—Tainniya. Page 67.

35. Ben.—Gulancha (গুলঞ্চ) ; Lat.—Tinospora cordifolia ; menispermum cordifolium ; Eng.—Tinospora ; Sans.—गुडूची, अमृता ; Hind.—गुड़च, घड़ञ्च ; Uria.—गुलञ्च ; Bom.—गारल ; Mar.—गुलवेलि ; Car.—अमरदवेलि ; Tel.—तिप्पतीगे ; Tam.—सिन्दिलकोडि ; Dec.—गलवेल ; Bur.— Page 68.

Page 69 36. Ben.—Kartodali (কড়তোদালি) ; Lat.—Toddalia aculeata ; Sans.—काञ्चन, दहन ; Hind.—दहन जङ्गलि कालिमिर्चि ; Uria.—तुन्दघरा ; Bom.—जङ्गलि कालिमिर्चि ; Mar.—लिमरि ; Tel.—कसिन्द ; Tam.—मिलकरणय ; Bur.—Kyanzah.

Page 70. 37. Ben.—Teuri (তেউড়ী) ; Lat.—Ipomœa Turpethum ; Sans.—त्रिवृत् ; Hind.—तरवद, निशोत, पिधोरी ; Bom.—फुट्कुरी, निशोत्रा ; Mar.—तियड़, निशोत्तीर ; Tel.—तेगड ; Tam.—शिवदइ ; Guz.—नशोतर ।

Page 72. 38. Ben.—Auntmul (অন্তমূল) ; Lat.—Tylophora Asthmatica ; Hind.—अन्तमूल, जङ्गलि पिकान् ; Uria.—मेरिड ; Bom.—पितमारि अन्यमूल ; Mar.—पितकारी ; Dec.—पिट्कारी ; Tel.—वेट्रिपालय, काक्रपाल ; Tam.—नायपालय ।

Page 73. 39. Ben.—Jangli Peanj (জঙ্গলি পেঁয়াজ) ; Lat.—Urginea Indica ; Eng.—Indian Squill ; Sans.—वनपलाण्डु ; Hind.—जंगलि पियाज ; Bom.—जंगलि पियाज ; राणकान्दा ; Dec.—कन्द ; Tel.—नक्कवुल्लिगड्ड ; Tam.—नरिवेङ्गायम ; Guz.—जंगलि कन्द ; Bur.—To-kesum.

Page 75. 40. Ben.—Jatamansi (জটামাংসী) ; Lat.—Valeriana Wallichii ; Punjab—बाला, तगार ।

ACACIÆ CORTEX.

Acacia Bark ; Babul Bark.

The dried bark of Acacia Arabica ; obtained from wild or cultivated trees, not less than seven years old, and when dried kept for one year before use. Taste astringent and mucilaginous.

Official part.

Chemical Composition—Contains tannin.

Preparation—Decoction Acaciæ Corticis—Dose—½ to 2 fl oz.

Physiological Action—Astringent, internal as well as external ; it is an equivalent of the official oak bark.

Therapeutics—The decoction of the bark is useful in Chronic Dysentery and Diarrhœa as an astringent enemata. In Chronic Dysentery with relaxed state of the Rectum and a little mucus in stools, the injection reduces the quantity of mucus, soothes the irritability and gives tone to the mucus membrane.

Astringent enema.

It is a useful gargle in spongy bleeding gums, mercurial salivation, and in relaxed sore-throat as well as in acute congestion of the throat. It is also a useful wash in hæmorrhagic ulcers.

Astringent gargle.

It is used as a local astringent injection in Leucorrhœa and forms an excellent substitute for oak bark for this purpose.

Astringent injection.

Dr. Joubert notes—"I have frequently used the decoction of Babul Bark as a substitute for oak-bark for vaginal injection. It might take the place of imported oak-bark."

Dr. Doyal Chandra Shome notes—"I have frequently used the decoction of the bark, as an astringent injection, in different forms of leucorrhœa and found it to be more efficacious and less irritating than the alum and zinc injection generally used."

The decoction is also useful as injection in cases of Prolapsus ani and Prolapsus uteri and in other uterine and vaginal affections of an asthenic nature.

Internally—The decoction may be used as an astringent tonic.

The powdered dry bark, dusted over sores and ulcers on the lips of horses, is one of the best cures for these troublesome affections.

Other Parts of the Tree-*Leaves*—Poultices of the bruised tender leaves are used as an excellent astringent and stimulant application to ulcers, attended with sanious discharge. The young leaves, in doses of two drams, are used in Gonorrhœa with good effects. The young leaves and pods are taken internally (beaten into pulp) in Diarrhœa. The *pods* contain 22-44 per cent of tannin (Allen).

The powder of the tender *legumes* of Acacia Arabica is astringent and demulcent and has a beneficial influence over Diarrhœa and Dysentery. Its usefulness is much enhanced by its combination with some preparation of opium. (Moodeen Sheriff)

ACALYPHA.

The fresh and dried herb, Acalypha Indica. Official part.

Composition—Contains an alkaloid *Acalyphine.*

Preparations :—

1. Ext. Acalyphæ Liq : Dose–5 to 30 minims.
2. Succus Acalyphæ : Dose–1 to 4 fl. drams.

Physiological Action—In small doses, it is expectorant and nauscent ; in large doses, it is emetic. The expressed juice of the leaves is in great repute, wherever the plant grows, as an emetic for children and is safe, certain, and speedy in its action. Like Ipecac, it seems to have little tendency to act on the bowels or depress the vital powers and it decidedly increases the action of the Pulmonary organs. Probably an infusion of the dried leaves, or an extract prepared from the green plant, would retain all its active properties. The expressed juice of the root and leaves has got a slightly laxative action on children (Pharmacopœa Indian). Also it is anthelmentic. It is an equivalent of Senega Root.

Expectorant.

Emetic.

Laxative.

Anthelmentic.

Therapeutics—It is a very good expectorant, useful in Bronchitis of children. In Asthma and Bronchitis this drug is useful for adults as well as for children. A tincture made from Spiritus Etheris with the fresh herb is specially useful in asthmatic troubles (3 oz. in one pint of Spiritus Etheris). Dose 20 to 60 minims, frequently repeated during the day with honey ; it acts as an expectorant and nauscent ; in large doses, it is an emetic.

In Bronchitis
&
Asthma.

1. Juice. **Other Uses of the Plant**—The fresh juice of the leaves, mixed with lime, is applied topically to painful rheumatic affections. It is useful in Scabies, Ringworm, and to maggot-eaten sores.

2. Cataplasm. A Cataplasm of the leaves is a useful local application to Syphilitic sores and also a means of relieving the pain and irritation attendant on the bites of Venomous insects (Centepedes). (Drury's Useful Plants of India.)

3. Insufflation. The juice of the plant is inserted, with pledgets of cotton wool, into each nostril, in congestive headaches; this relieves the head symptoms by causing hæmorrhæge from the nose.

In the early stage of Acute mania, the Hakims drop fresh juice (one ounce) with common salt (gr. 6) in both nostrils every morning, followed by cold shower bath for three mornings successively. This acts as a "Brain-Purge," so called owing probably to a quantity of mucus and other matters escaping from the nostrils, immediately after the application of the above recipe.

4. Suppository. Fresh leaves, ground into a paste, made into a ball, to the size of a large marble and introduced into the rectum, is very useful in relieving the obstinate constipation of children.

5. Powder. The powder of the dry leaves is used in bedsores and wounds attacked by worms.

Root. The root possesses purgative properties; bruised in hot water, it is employed as a cathartic.

ADHATODA.

Official part.

The fresh and dried leaves of Adhatoda Vasica. It has a strong characteristic tea-like odour and a bitter taste.

Chemical Composition—Contains an alkaloid "Vasicine" *(Warden)* and an organic acid "Adhatodic acid."

Preparations—

1. Ext. Adhatoda Liq. : Dose—20 to 60 minims.
2. Succus Adhatoda : Dose—1 to 4 fl. drams.
3. Tinctura Adhatoda : Dose—½ to 1 fl. dram.

Physiological Action—Antispasmodic and Expectorant.

In Bronchitis.

Therapeutics—In chronic Bronchitis, asthma and other pulmonary affections, when not attended with febrile reactions, the drug is a very useful expectorant (sedative). The addition of long pepper seems to increase its efficacy. This medicine was considered so serviceable in Phthisis that it was said that "no man suffering from this disease (*i.e.* Phthisis Pulmonalis) need despair as long as the Vasaka plant exists" *(Hindu Materia Medica : Dr. U. C. Dutta)*.

In Phthisis Pulmonalis.

Hæmostatic.

The juice of the is used in Dysentery and Diarrhœa ; it is considered especially useful in Hæmoptysis and bleeding in Dysentery.

In Bengal, the leaves are smoked for Asthma.

1. Flowers and Fruits.

Other Parts of the Plant—The *flowers and fruits* are bitter, aromatic and antispasmodic. The flowers are useful in hectic heat of blood and Gonorrhœa. The fruit is sometimes hung round the necks of children to keep them from catching cold. The root is useful in cough, asthma, febrile disturbances and gonorrhœa. 2. Root.

The flowers, leaves and root, but especially the first, as they have got antispasmodic properties, are prescribed in certain cases of asthma and to prevent the return of rigor in intermittent fever; they are bitterish and sub-aromatic and are administered in Infusion or Electuary. In the last-named form, the flowers are given to the quantity of a tea-spoonful twice daily.

The decoction of the fresh leaves is very useful in Bronchial cattarh. The decoction is also used to quench thirst in fever.

ALSTONIA.

Official part. The dried bark of Alstonia Scholaris; it is almost without odour. When chewed, it develops a bitter taste.

Chemical Composition—The bark contains an active principle "Ditain," which ranks equal in therapeutical efficacy with the best "Sulphate of Quinine." The bark yields about ·02 per cent of the alkaloid "Ditamine."

Preparations—

1. Infusum alstoniæ: Dose—½ to one fl. oz.
2. Tinctura alstoniæ: Dose—½ to one fl. dram.

Physiological Action—The action of Ditain has been examined by Dr. Erich Hornack (Ditain, Lepsic, 1877) who has found that in frogs it acts as a paralyzant upon the motor nerve centres and upon the motor nerve trunks and that it is also a paralyzant of the vagi. Upon mammals, its influence resembles closely that of curare; the peripheral nerve-endings are paralysed by it as are also the peripheral vagi and vasomotor nerves.

Equal doses of Ditain and quinine sulphate have got the same medicinal effects; besides, having none of the disagreeable secondary symptoms, such as deafness, sleeplessness and feverish excitement, which are the usual concomitants of large quinine doses, ditain attains its effects swiftly, surely and infallibly. Therefore, it is used as an Antiperiodic. It is also an astringent tonic and anthelmentic.

In fevers.

Therapeutics—It is now employed with most satisfactory results in the island of Mindando, where malignant fevers are prevalent, in place of sulplate of Quinine.

In chronic Dysentery and Diarrhœa.

In chronic Diarrhœa and in advanced stages of Dysentery, it has proved very valuable. It has also been found effectual in restoring the tone of the stomach and of system generally, in debility after fevers and other exhausting diseases.

Hindu Physicians describe it as a tonic, alterative, and useful in fever, skin diseases and Dyspepsia.

In catarrhal dyspepsia.

In catarrhal Dyspepsia, 15 grains are to be taken at bed time in powder or decoction.

The tincture of the bark acts in certain cases as

As a galactagogue.

a powerful galactagogue. In one case, the use of the drug was purposely discontinued at intervals and on each occasion the flow of the milk was found to fail.

Juice.

Other Uses ot the Tree—The juice of the fresh bark, with milk, is administered in Leprosy in Concan, and is also prescribed for Dyspepsia and is an anthelmentic.

The juice of the leaves with that of fresh ginger root is administered to women after confinement.

Poultice.

The poultice of the powdered bark, with equal quantity of cornflower, is useful in inflammatory affections.

Alstonia Constricta.

Its Composition.

N. B.—The bark of Alstonia Constricta, which is official in the Australian Colonies, and which is a native of Australasia,—is much more active than Alstonia scholaris. It contains 4 alkaloids; (1) Alstonine (2) Porphyrine (3) Porphyrosine (4) Alstonidine. The dose of this tincture should not be large; *i.e.* it should be from 5 to 20 minims and not ½ to 1 fl. dram as is given in the Addendum.

In Influenza.

Alstonia Constricta bark is a useful tonic having some of the advantages of both Peruvian Bark and Nux Vomica without many of their disadvantages. It is particularly useful in Influenza in dose of 5 to 20 minims. It acts on the skin and kidneys, and so aids in the elimination of the influenzal poisonous products, and thus it can be employed as soon as the acute symptoms have passed off. (For reference see *Lancet*, February 9, 1901, and *Pharmaceutical Journal*, March 23, 1901, Page 362. By Gordon Sharp, M.D.)

ANDROGRAPHIS.

Kalmegh.

The dried plant, Andrographis Paniculata ; the dried plant is without odour, its taste is intensely bitter. Official part.

Chemical Composition—The intensely bitter taste appears to be due to an indifferent non-basic principle, since the usual reagents fail to indicate the presence of an alkaloid. Tannic acid produces an abundant precipitate. The infusion is but little altered by salts of iron. It contains a considerable quantity of chloride of Sodium (Pharmacographia—Flückiger and Hanbury). It is an equivalent of chiretta.

Preparation—

1. Inf. Andographidis : Dose—½ to 1 fl. oz.
2. Liq. Andographidis Concentratus : Dose—½ to 1 fl. dram.
3. Tinctura Andrographidis : Dose—½ to 1 fl.dram.

Physiological Action—The roots and leaves are febrifuge, stomachic tonic, alterative and anthelmentic.

Therapeutics—It is used as a tonic, stimulant and gentle aperient in the treatment of several forms of Dyspepsia and in the torpidity of alimentary canal. In Dyspepsia.

In general dibility, in convalescence after fevers, and in advanced stages of Dysentery, it has been found serviceable. It is also a cholagogue, antipyretic and febrifuge. *Brigade Surgeon G. G. Hunter* considers it superior to Quinine. In Fevers.

It is highly useful in sluggish liver, Neuralgia, Dyspepsia, chronic Dysentery and dibility after fevers, and it acts wonderfully well, as a strong, sure and safe cholagogue in gouty Dyspepsia. It has also been extolled in infantile liver, a common complaint in Calcutta.

As a Cholagogue.

It is also very useful in low remittent fevers of children, especially efficacious when combined with arsenic.

As a domestic medicine.

Other Uses—Green leaves are given with aniseed (4 to 20) as a stomachic and anthelmentic. It is the principle ingredient of the domestic medicine, called "Alui", which is given to children for the relief of griping, irregularity of bowels and loss of appetite. It is prepared as follows:—Take Cumin, Aniseed, Capsules of greater cardamoms,—pound them well with the expressed juice of the leaves of Kalmegh; the mass thus prepared is divided into small pills and dried in the sun.

One pill, rubbed down with human milk, is an ordinary dose.

It is also used as a domestic remedy for fevers, in combination with aromatics *viz.* lemongrass. The dose of the dried leaves is 10 grains with 20 grains of black pepper.

ARISTOLOCHIA.

Official part.

The dried stem and root of Aristolochia Indica. The odour is spicy and camphoraceous and the taste is bitter and camphoraceous.

Chemical Composition—It contains a volatile oil, tannin, a bitter principle (the Resin) and starch. The bitter resinous substance is the active principle of the plant and is soluble in alcohol and insoluble in water.

Preparation—

1. Liq. Aristolochiæ Concentratus : Dose—½ to 2 fl. drams.
2. Tinctura Aristolochia : Dose—½ to 1 fl. dram.

Physiological Action—It is a bitter tonic, stimulant and emmanagogue. It is also considered to be attenuent, deobstruent and antarthritic. It is an equivalent of Serpentary Rhizome.

In Fevers.

Therapeutics—It is very useful in fever ; it is administered rubbed into a paste in cold fever, headache, flatulent distension and Dysuria.

As a lotion, it relieves gouty pains, and the powder, with pepper and hot water, stops bloody fluxes.

In teething of children.

It is a valuable medicine in the bowel affections of children when they are teething, and in cholera it is regarded as a stimulant tonic and is also applied over the abdomen.

Emetic.

Other Uses—The juice of the fresh leaves is very useful in the croup of children by inducing vomitting, without causing any depression.

External Uses—The plant boiled in oil is applied as a liniment in snake-bite and a decoction is given internally.

AURANTII CORTEX INDICUS.

Indian Orange Peel.

The fresh and dried outer part of the pericarp of varieties of Citrus Aurantium, grown in India and Ceylon. Official part.

N.B.—In India, Indian Orange Peel, fresh or dried, may be employed in making the official preparation for which fresh or dried bitter-orange peel is directed to be used.

Chemical Composition—Orange peel has a grateful aromatic odour and a warm bitter taste, which depend upon the volatile oil contained in its vesicles. The white spongy inner coating of lemons as well as other fruits of the genus contains a bitter principle "Hesperidin," discovered by *Lebreton* in 1828. *Tanret* found in the rind of the bitter orange—1. a crystalline acid $C_{44} H_{28} O_{14}$, 2. a crystalline resinous body, 3. Hesperidin, 4. Isohesperidin, a crystalline glucoside isomeric with hesperidin, 5. Aurantiamarin, new glucoside to which bitterness of the oil is due.

The oil may be obtained by expression from the fresh grated rind or by distillation with water. It has properties resembling these of oil of lemons, but spoils more rapidly on exposure to the air acquiring a terebinthinate odour.

Physiological Action—Aromatic tonic, carminative and stomachic. Dose in substance is from ½ dram to one dram. Violent colic, convulsions, and even death has been caused in children by eating large quantities of rind.

Therapeutical Uses—This is chiefly employed to communicate a pleasant flavour to other medicines, to correct their nauseating properties and to assist their stimulating action upon the stomach. They are a frequent and useful addition to bitter infusions and decoctions, such as those of Gentian, Quassia, Calumba and Peruvian Bark. It is obviously improper to subject orange peel to boiling for a long time as the volatile oil is thus driven off.

As a Corrective.

It is useful in atonic Dyspepsia and general dibility, but it is rarely used alone. It is useful in checking vomiting and the prevention of Intestinal worms. It is generally used in the form of Infusion, Tincture, or Syrup. The rind, pulverized and added to magnesia and rhuberb, affords a grateful tonic to the stomach in gout and dyspepsia.

In Dyspepsia.

External Use—The fresh rind of the fruit is rubbed on the face by people suffering from acne. The rind mixed with little water and rubbed on an eczematous part gives much relief. Orange poultice is recommended in diseases such as psoriasis. The roasted pulp is an excellent application on fætid ulcers.

In acne.

The Flowers—The water, distilled from the orange flowers, is employed as an antispasmodic and sedative in nervous and hysterical cases. The syrup of orange flowers is chiefly used as a flavoring agent and to perfume external application.

The Fruit : *Ainslie* notes—"Oranges are in great repute amongst Hindu physicians, who suppose that they purify the blood, allay thirst in fevers, cure catarrh and improve the appetite. A sherbat made with the juice of the ripe fruit is a favorite beverage in the hot weather." This is valuable in bilious affections and stops bilious diarrhœa.

This is recommended by Mahomedan writers in colds and coughs, when febrile symptoms are present ; it is best administered baked with sugar. (Dr. Dymcock. Mat. Medica, Western India.)

AZADIRACHTA INDICA.

Neem Bark : Magarosa Bark.

The dried bark of the stem of Melia Azadirachta.

Official part.

Composition—According to Broughten, Neem bark contains a bitter amorphous resin $C_{36}\ H_{50}\ O_{11}$ which fuses at 97°C. and a crystalline principle melting at 175°C. (*Pharmaceutical Journal*, 1873, Page 992). If required for medicinal purposes, the most suitable and convenient mode would be an alcoholic solution of the resin.

Preparation—

1. Infusum Azadirachtae Indica: Dose—½ to 1 fl.oz.
2. Tinctura Azadirachtœ Indica : Dose—½ to 1 fl. dram.

Physiological Action of the Bark—Root bark and Bark—bitter, tonic, astringent and antiperiodic. The root-bark is more active.

In Fevers.

In skin diseases.

As a vermifuge.

Therapeutics—In intermittent and other paroxysmal fevers, in general dibility and convalescence after febrile and other diseases, the bark has been employed with success. It is also useful as a bitter tonic in all forms of skin diseases. It is used as a tonic vermifuge (Oxyuris Vermicularis). A decoction of the Neem bark is useful as a tonic and antiperiodic in the milder forms of Malarial Fevers *(Surgeon R. D. Murray).*

Dr. R. L. Dutta notes that "Decoction of Neem is a valuable tonic and alterative and is very useful in chronic fevers during convalescence from febrile complaints and in cutanious eruptions."

Other Parts of the Plant—

Neem Cups—Like "Quassia Cups" are used for drinking water. The water so drunk becomes stomachic in contact with the wood.

Leaves—

Composition—The leaves contain a bitter principle, more readily soluble in water than the resin of the bark of which it is a hydrate. This substance also occurs in the bark and closely resembles the resin in properties. The leaves contain no peculiar alkaloid.

Leaves. External use.

Therapeutics—The leaves form a useful local application to ulcers and obstinate skin diseases, when a mild stimulant is required ; also it acts as an antiseptic.

(*a*) Poultice.

The Poultice of the Neem leaves is a good stimulant application to indolent and ill-conditioned ulcers ; should it cause pain and irritation, equal parts of rice flower or linseed meal may be added, The leaves are added to poultices to disperse glandular tumours and is very useful to hasten suppuration or to disperse inflammation and are used generally as a discutient beaten into a pulp; they are applied to pustulor eruptions, more especially to eruptions of small-pox; it is also useful in obstinate skin diseases. The leaves made into a pulp may be applied externally over the mammæ as a lactifuge.

(*b*) Pulp.

(*c*) Ointment.

An ointment made from the leaves, fried in ghee and subsequently mixed with wax or ghee, makes a good stimulating application to indolent ulcers.

(*d*) Decoction of the leaves.

The decoction of the leaves might be used as an antiseptic lotion for the dressing of wounds and ulcers. "It is a very good alterative and antiseptic wash for unhealthy sores." *(Dr. R. L. Dutta.)*

A hot infusion of the leaves is much used for fomenting swollen glands, bruises, and sprains and appears to be anodyne.

A mixture of bruised leaves, with turmeric, is rubbed over the body during the disquamative stages of eruptive diseases, such as small-pox. It hastens the separation of the crusts, probably acting as an antiseptic and promoting healing of the sores.

Anthelmentic.

Internally—The juice of the leaves is anthelmentic and is given in a variety of diseases, such as jaundice, prurigo, boils. The leaves are powerful, bitter, and strong infusion is efficacious in intermittent fever as well as in liver complaints. (Dr. White). The leaves are occasionally used with brengils or other vegetables and act as an anthelmentic. *(Dr. R. L. Dutta).*

The Fruit—is purgative, emollient and anthelmentic.

The Seeds—The oil expressed from the seeds is known as Margarosa or Neem oil. This oil saponifies readily. It contains ·109% of Sulphur.

Therapeutics—This oil has proved a useful local application to some forms of skin disease, ulcers, Rheumatism, sprains and is antiseptic. It is also an useful adjunct to Chaulmoogra oil in cases of Leprosy. Its antiseptic properties might be taken advantage of, for the manufacture of a medicated soap, as the oil readily saponifies. This soap might be very serviceable for the purpose of washing sores and for the general uses in which carbolic soap is now put. As the oil contains a marked amount of sulphur, the Neem-oil soap is very useful, in cutaneous affections, in which a mild sulphuretted application is indicated. The beneficial effects of the oil, when rubbed into the skin in Rheumatism, is doubtless due to the presence of organically combined sulphur.

1. In Skin disease.

2. In Leprosy.

3. As Soap.

The oil of the seeds, is useful in the destruction of lice and as an application in urticaria and Eczema. It forms a valuable remedy for fleas in dogs and for obstinate mange in the same animals. It it is also a very useful application to suppurating Scrofulous glands.

Dr. R. L. Dutta, notes on the use of the oil in Leprosy, in his annual medical reports of the Bankura jails 1879-1881.

"The expressed oil of the seed I tried in convict lepers for 4 years in Bankura jails. It was used in the form of a bath. In almost all the cases, great relief was obtained. The results were as follows :—

(*a*) In anæsthetic cases, great improvement followed in sensation and the eruptions diminished. In some cases, the improvement was so great, that they could not be distinguished from healthy men. With hard work or other debilitating causes, there was however, a return of the original symptoms.

(*b*) In tubercular cases, both thickening and ulceration become less and in some cases, entirely disappeared.

(*c*) In the mixed form, the effects were no less marked. I tried both this and Gurjan oil and I consider Neem oil better of the two.

Demulcent tonic.

The Gum—is a demulcent tonic and is a better auxiliary to other remedies than Gum Arabic and Feronia gum, in catarrhal and other affections, accompanied by great weakness. It is used by lying-in women, as a stimulant.

The Dried flowers—are used as a tonic after fevers, also they are useful in some cases of atonic dyspepsia and general debility.

BELAE FRUCTUS.

Bael Fruit.

Official part.

The fresh half ripe fruit of Ægle marmalos—it has a faint aromatic odour and its taste is mucilaginous, slightly acid, and faintly astrnigent.

Chemical composition—According to *Dr. Macnamara* and *Mr. Pollock*, Bael contains tannic acid, a concrete volatile oil, a bitter principle and a balsamic principle resembling Peru Balsam. But *Professors Fluckiger* and *Hanbury* in their Pharmacographia say that they are unable to confirm the conclusions arrived at, and that it does not contain any appreciable amount of tannin. But *Dr. Warden* showed that a section of both the ripe and unripe fruit when moistened with a solution of ferric chloride gives the most marked tannic acid reaction, strongest in those portions of the pulp nearest to the rind. The clear mucilage which surrounds the seeds has an acid reaction and is readily soluble in water and gives no reaction with ferrous or ferric salts. It contains lime

The bael contains mucilage, pectin, sugar, traces of tannin, bitter principle and valatile oil (*Pharmaceutical Journal, Feb., 1900, page 660*)

Preparation.—Ext. Belae Liquidum : dose 1 to 2 fl. drams. (Made from the fresh fruit)

Physiological action.—The unripe and half-ripe fruit is astringent, digestive and stomachic. It is not improbable that its action is that of a mild stimulant of the intestinal mucous membrane, as experience has shown that while it tends to arrest diarrhœa when present, it no less certainly acts as a : when constipation exists ; under each tends to give tone to the intestinal tubes.

Astringent
Digestive
Stomachic.

Dr. Kannilal Dev notes that astringent action is not due to the traces of tannin but this is due partly to pectin and the clear mucilage which surrounds the seeds and partly to the astringent acids present in the unripe fruit.

The ripe fruit is laxative.

In atonic Diarrhœa & Dysentery.

Therapeutics—The unripe fruit is regarded as astringent, digestive and stomachic and is prescribed in diarrhœa and dysentery with debility of the mucous membrane, often proving effectual in chronic cases after all other remedies have failed. It seems specially useful in dysentery where there is a scorbutic taint, as those found in the Indian jails.

The pulp of the green fruit softened by roasting and sweetened with sugar candy, is useful in chronic diarrhœa and dysentery. In acute dysentery it is not so useful, owing to the rapidity with which inflammation proceeds and grave ulceration supervenes.

Powder.

Syrup.

Moodeen Sheriff notes that the powder is more useful in acute disease and syrup in chronic disease. In acute dysentery the powder should be administered in much larger doses than in any other disease.

1. In dysentry.

Its first good effect is the rapid disappearance of the blood and the increase in the fæculent matter in the motions. It seems to have more power to alter the nature of the motions than to reduce their number. For the latter purpose *i.e.* to check the frequency of the motions it requires to be combined with some preparation of opium.

2. In Fever

The powder of Bael t is also useful in relieving the febrile symptoms in all forms of idiopathic fevers, including hectic and typhoid. The abonormal temperature in febrile conditons is reduced under its use in a very remarkable manner.

Dose of the Powder.—As a remedy in dysentery, from

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20 grains to 1 dram 4, 5 or 6 times a day; and for all other purposes, 10 to 20 grains.

Dose of the Syrup.—2, 4 or 6 fl. drams 3 or 4 times in 24 hours.

Bael Sherbet.

The Ripe fruit.—Is sweet, aromatic and cooling; made into a sherbet and cooled with ice, it is pleasantly laxative, and a good simple cure for dyspepsia, and is useful in febrile affections. The dried ripe fruit is mildly astringent and may be used in dysentery. A useful popular preparation—bael marmalade or bael *morubba*—may be taken like jam at the breakfast table in convalescence from chronic dysentery and diarrhœa.

Bael morabba.

Dr. R. L. Datta notes the value of the sherbet in seasons of prevalence of bowel-complaints and cholera. The strained pulp of the half roasted unripe fruit is more efficacious than the extract sold by the English druggists in diarrhœa and dysentery.

The ripe fruit is an excellent laxative. The sherbet should be made thin enough, so as to be taken with a spoon, and a small tumblerful is quite enough for laxative effect. It is very useful in dyspepsia and in habitual constipation.

Root bark.

Other parts of the plant.—The root bark (sometimes the stem-bark) is made into decoction and is used in intermittent fevers. It is given in hypochondriasis and palpitation of the heart. It is one of the "Daṣamula" It has also got a laxative effect.

Leaves.

The leaves.—The fresh juice is bitter and pungent and acts as a mild laxative in cases of fever and catarrh and probably acts as a curative. The decoction of the leaves is used as a febrifuge and expectorant. As an expectorant it is used in asthmatic complaints, and with addition of black pepper in anasarca with costiveness and jaundice.

Stem-bark.

The juice of the stem bark.—In two-tola doses, is given with little cumin in milk as a remedy for poverty of the seminal fluid.

BERBERIS.

Official part.

The dried stem of Berberis Aristata.—It has a faint odour and a bitter taste

The root bark is official in *Waring's Indian Pharmacopœia.*

Composition.—Contains a bitter principle "berberine" in great abundance (alkaloid) and starch.

Preparation.—1. Liq. Berberidis Concentratus :—Dose ½ to 1 fl. dram.

2. Tinctura Berberidis—Dose ½ to 1 fl. dram.

Physiological action.—Berberine in doses of 1½ grains given subcutaneously, killed rabbits with symptoms of prostration and fall of temperature ; but a dose eight times as great, by mouth, has no action, and 15 grains only produce in man slightly colicky pains and diarrhœa. It causes contraction of the intestines and of the spleen and lessens oxidation in the blood *(Lauder Brunton).* The drugs which contain this alkaloid are very useful in malarial dyspepsia, accompanied by a febrile condition.

Therapeutics.—Tonic, anti-periodic, diaphoretic and alterative.

Powerful antiperiodic and febrifuge action has been confirmed by *Dr. Simpson* in fevers of this country (ague and remittent fevers). *(Ranking's Extract Vol II. 1846, p. 411)*

In Fevers.

Drs. Bennet and *Simpson* found this drug very efficacious for periodic neuralgia, and in some cases of Tic with complete success like quinine. *Dr. Piorry* preferred this preparation in the treatment of miasmatic fevers to quinine. Whenever he found the spleen enlarged in a patient suffering from ague, intermittent or hectic, he gave *berberis* instead of quinine, and the fever abated in a few hours. *(Lancet Vol I.'72, p. 498).*

In periodic neuralgia and Tic.

In Enlarged spleen.

Typaldo Lascarato has recently experimented clinically on the action of this antiperiodic medicine, from which it appears to be a valuable aid in the treatment of splenic swellings of malarial origin. The action of *berberis* is due to the fact, that it produces a contraction of the tissues of the spleen which needs, however, careful watching, since excessive doses of the alkaloid, are apt to cause rupture of the organ, which terminates almost invariably in fatal hæmorrhage. The contraction of the spleen serves the purpose of ejecting its contents, and often the administration of *berberis* is immediately followed by a severe attack of fever which is probably due to the entrance of the malarial parasites into the blood circulation. This symptom favours the furthur development of the disease in as much as, carefully watched, it furnishes the means of energetically suppressing the development of the parasites. This is effected with the aid of quinine which has been found from experience to

Mode of action.

act most energetically upon the parasities driven in this manner, into the circulation of the blood. In those cases, where the spleen had already undergone degeneration, the treatment is naturally without avail.—*Lascarato* recommends the following formula as prescription of berberine.

Re

Berberine Hydrochorate—grains 15.

Quinine bi-sulphate—grains 7½.

Divide in 4 equal doses ; to be taken in wafers at intervals of half to one hour *(E. Merck's Annual Report 1899 page 44).*

Dr. Stiven—recommends this as a diaphoretic and antiperiodic in the accession of the cold stage of fever after the bowels have been thoroughly opened by a purgative. The effect produced by this remedy is as good as that produced by *Warberg's* fever drops.*

Moodeen Sheriff observes—as an antiperiodic and antipyretic it is at least equal to quinine and *Warberg's* tincture respectively ; as a diaphoretic, decidedly superior to *Jame's* powder. It is of the greatest service in relieving pyrexia and in converting continued and remittent fevers into the intermittent and also in preventing the paroxysm of the latter. In addition to its cheapness, its advantages over Warberg's tincture and quinine are that however repeatedly it may be used, it neither produces a great depression of the system nor has any bad effect on the stomach, bowels, brain and the organs of hearing. Unlike the alkaloids of cinchona it can be employed beneficially during an attack of fever. To ensure the full antiperiodic effect, the drug should not only be employed during the paroxysm but also in the same dose, every fourth or fifth hour, in the intermissions ; the cure is completed by the continued use of the drug in small doses, for 4 or 5 days more after the fever ceases to return.

In Syphilis and Scrofula.

It is very useful in chronic syphilitic and scrofulous cachexia, in chronic skin diseases specially of the scaly type, in convalescence from malarious and other fevers and in chronic uterine disease and also in Mennorrhagia.

In Hepatitis.

By some it is believed to have a distinct action upon the Liver and is very valuable in chronic hepatitis. It is also very useful in cases of fever when bilious symptoms and diarrhœa are present. *Dr. D. D. Kar* says that it is contra indicated when there is inflammation in the liver and in dysentery.

In Ophthalmia

Rusot.—is an extract from the wood and roots of different species of berberis, growing in upper India. Combined with opium and alum it is much used and with great benefit in both incipient and chronic ophthalmia. Trials with it were instituted by *Dr. Wise* at the Eye Infirmary, Calcutta and by *Mr. Walker* at the Edinburgh Eye Infirmary.

Suitable cases.

The cases in which it proved most effectual in Mr. Walker's hand were those of the Conjunctiva such as the simple catarrhal and pustular forms of ulceration. The other affections benefitted in a minor degree were simple rheumatic or catarrho-rheumatic inflammation and ophthlmia tarsi. Professor Simpson in his own practice in two cases of recent conjunctival ophthalmia found speedy relief and eventual cure by its means.

Mode of application.

The mode of application consists in mixing equal weights of *Rusot* and alum and half the weight of opium with lemon or lime juice, till the mixture has got the consistency of cream and applying it round the eyelids and over the eyebrows of the affected organ, repeating the application twice in 24 hours. Its application is attended with a considerable or even painful sensation of burning.

In aphthæ.

It is also mixed with honey as an application in aphthae and ulceration of the skin and mixed with milk it is dropped into the eye in conjunctivities.

As a febrifuge.

It is also used as a febrifuge and tonic by the people of this country in doses of ½ to 1 dram.

The root bark.—has been used in ague with good results.

The fruit is cooling and acid. It contains tartaric and malic acids and useful as an antiscorbutic.

BETEL.

Official part.

The leaves of Piper Betle,—they have a warm aromatic bitter taste.

Composition.—Dymock states that D. S. Kemp in 1885 obtained two pale yellow oils by distilling the fresh leaves with water, one heavy and the other light. Both had the peculiar odour of the leaf, but the light was the more aromatic of the two.

"Arakene."

From an ethereal solution of the leaves an alkaloid, called "arakene," has also been recently obtained, from which salts similar to those of cocaine have been produced. The taste of the alkaloid and its salts is slightly acid. They increase the flow of saliva, slow the action of the heart and have a purgative effect.

As a masticatory.

Action and uses.—The leaves of the creeper is masticated by the people of India. The poorer classes make their packet of betle with the addition of lime, catechu and betle-nuts. The rich add cardamoms, nutmegs, cloves, camphor and other aromatics. Betle leaves, thus chewed, act as a gentle stimulant and exhilarant; those accustomed to its use feel a sense of langour when deprived of it.

According to *Susruta*, it is aromatic, carminative, stimulant and astringent. It sweetens the breath, improves the voice and removes all foulness from the mouth; others say it is aphrodisiac as well.

Medicinally, it is said to be useful in diseases supposed to be caused by deranged phlegm and its juice is much used as an adjunct to pills administered in these diseases; that is the pills are rubbed into an emulsion with the juice of the betel-leaf and licked up. Being always at hand, pan leaves are used as a domastic remedy in various ways.

The stalk of the leaves, smeared in oil, is introduced into the rectum in the constipation and tympanitis of children with the object of inducing bowels to open.

The leaves (warmed by fire) are applied to temples in headache for relieving pain, to painful swollen glands for promoting absorption and to the mammary glands with the object of checking the secretion of milk.

Pan leaves are used as a ready dressing for foul ulcers.

Excessive use of it produces effects somewhat similar to those of alcoholic intoxication.

Essential oil.

Of late years, medicinal properties of betel leaves have been investigated in Europe. Dr. Kleinstuck of Zwatzen, near Jena, has found that the essential oil is of much use in catarrhal affections, inflammation of the throat, larynx and bronchi; it has an antiseptic action. He has also used it in diphtheria as a gargle and by inhalation. The dose is one drop in 100 grams of water (about 3½ oz.) In India the juice of the leaves may be used similarly diluted.

Antiseptic.

In catarrhal and pulmonary affections.

In catarrhal and pulmonary affections, especially of children, the leaves warmed and smeared with oil are applied in layers over the chest. This affords relief to the cough and dyspnœa (*Waring*).

Dr. Gilson states that similar application affords marked relief in congestion and other affections of the liver. They are used similarly as resolvant to glandular swellings.

The fruit.

The root.

In the Konkan the fruit is employed with honey as a remedy for cough and in Orrissa the root is said to be used to prevent child-bearing.

The juice of the leaves.

Ainslie states that the warm juice of the leaves is prescribed by the Vytians as a febrifuge in the quantity of a small teaspoonful twice daily; it is also given in the indigestion of children and in conjunction with milk in cases of Hysteria.

BUTAE GUMMI.

Butea Gum.

Bengal kino.

Official part.

The inspissated juice obtained from incisions in the stem of Butea. Frondosa. It has no odour—Taste is astringent.

Composition—Contains tannic acid, pyro-catechuic acid and gum. Butea gum may be employed in making the official preparation for which kino is directed to be used.

Astringent.

Physiological action and uses—It is an excellent astringent, similar to catechu, but being mild in operation it is better adapted for children and delicate females. The dose of the powdered gum is from 10 to 30 grains with a few grains of cinnamon. The addition of little opium increases its efficiacy.

The fresh juice of the tree is very useful in Phthisis and in haemorrhagic affections. It is also used as an application to ulcers and relaxed sorethroat.

As an astringent the gum is given in diarrhoea and dyspepsia. The use of the gum as an external astringent application is mentioned by *Chakradutta* ; it is directed to be combined with other astringents and rocksalt. He recommends the mixture as a remedy for Pterygium and opacities of cornea.

BUTÆ SEMINA.

Official part. The seeds of Butea Frondosa :—These have a faint odour and a stightly acrid taste. It is vermifuge and equivalent of Santonin.

Chemical composition—contains an oil which possesses anthelmentic properties. It is known as "Moodooga oil."

Preparation—1. Pulvis Butae Semina—Dose 10 to 20 grains.

Rubefacient. **Physiological action**—*Externally*, the seeds are rubefacient when pounded with lemon juice. *Internally*—

Anthelmentic. The seeds are anthelmentic as well as purgative which proves injurious to their anthelmentic property. In some instances they have been found to excite vomitting and to irritate the kidney.

Therapeutics—The seeds should first be soaked in water, the testa or shell carefully removed ; the kernel should then be dried and reduced to powder. Of this, the dose is 20 grains, thrice daily for 3 successive days followed by a dose of castor oil on the 4th day. Under the use of this remedy thus administered, in the practice of *Dr. Oswald* 125 Lumbrici in one instance and between 70 and 80 in another, were expelled—It has the disadvantage of occasionally purging when its vermifuge properties are not apparent.

Mode of administration.

In the *Bhabaprokasa* the use of the seeds of Palasa as an aperient and anthelmentic is noticed and they are directed to be beaten into a paste with honey for administration.

Externally—The seeds have been used successfully in the cure of a variety of chronic eczema known as *Dhobie Itch.* When made into a paste they are used as remedy for ring-worm.

In chronic Eczema.

Other parts of the plant :—

1. Leaves are astringent, tonic and aphrodisiac and are used to disperse boils and pimples and are given internally in flatulent colic, worms and piles.

Leaves.

2. The flowers are astringent, depurative, diuretic and aphrodisiac ; as a poultice they are used to disperse swelling and promote diuresis and the menstrual flow. They are given to enceinte women in cases of diarrhoea and are applied externally in orchitis.

Flowers.

3. The bark is given in conjunction with ginger in cases of snake bite.

Bark.

CALOTROPIS.

Synonym Madar. Akanda.

The dried root bark of Calotropis procera and of Calotropis gigantea freed from the outer corky layer.

Official part.

Chemical composition—The root bark contains an acrid resin, a crystalline body named "Mudaralban," a viscid substance, named "Madarfluavil" and caoutchouc.

Preparation—

1. Pulv—3 to 10 grains as a tonic, 30 to 60 grains as an emetic.

Physiological action—Alterative tonic, diaphoretic and in large doses emetic and so can be used as a substitute for ipecac.

Modern physiological research has shown that the juice applid to the skin acts as an irritant, the practice of applying it with salt to bruises and sprains to remove pain is therefore rational ; also the application of the fresh bark in chronic Rheumatism ; given internally in small doses the drug stimulates the capillaries and acts powerfully upon the skin ; it is therefore likely to be useful in elephantiasis and leprosy (Casanora).

In large doses, calotropis causes vomitting and purging and acting as an irritant-emeto-cathartic.

The root bark is said to promote the secretions and to be useful in skin diseases, enlargement of the abdominal viscera, intestinal worms, cough, ascites and anasarca. It is an efficient antispasmodic, alterative and tonic.

It is a very useful therapeutic agent in some cases of asthma, epilepsy and paralysis.

As a substitute for Ipecac in Dysentery.

Therapeutics—The dried bark is considered as a substitute for ipecac and as such it is used in dysentery *Dr. Durand* writes in the *Indian Medical Gazette 1866, May*, that 20 to 60 grains doses, like ipecac, act as a certain chologogue and has a direct sedative action on the muscular fibres of the intestines especially colon and rectum, allaying all pain, tenesmus, irritation and as it were putting a stop to all dysenteric actions ; the more scanty, frequent and bloody the stools, the more quickly and efficiently it seems to act.

It acts generally in less than 24 hours after the first dose of 20 or 30 grains has been given and retained.

As alterative tonic.

As an alterative tonic it has a beneficial influence over some forms of secondary syphilis and is also useful in some recent cases of leprosy and a few other skin diseases. It is held in great esteem by the Hindu practitioners in the treatment of some venereal and skin diseases, so much so, that it is called by some of them as the "vegetable mercury."

As a diaphoretic it often relieves pyrexia by producing perspiration in cases of simple and slight fevers.

Mr. Playfair speaks of alterative stimulant and deobstruent virtues of the bark in cases of syphilitic lepra and hectic fevers.

It is also useful as an emmanagogue. The decoction of the root is useful as an antiperiodic.

In elephantiasis.

External Uses—The root bark reduced to a paste with sour "conje" is applied to elephantiasis of the legs and scrotum.

The milky juice.

Other parts of the Plant—The milky juice is regarded as a drastic purgative and caustic. Medicinally recommended for skin diseases, ringworm of the scalp, and to destroy piles. Mixed with honey it is viewed as useful in the treatment of aphthæ of the mouth and a piece of cotton wool dipped in the juice, and inserted into a hollow tooth, is reported to cure toothache.

Hakim Mir Abdul Hamid recommends it in leprosy, hepatic and splenic enlargements, dropsy and worms (steep different kinds of grains in the milky juice and then administer them).

It is a favourite application to painful joints and swelling and a local application in cases of Guinea-worms.

The flowers. **The Flowers**—are considered digestive stomachic and tonic and useful in cough, asthma, catarrh and loss of appetite, also useful in hysteria and epilepsy. The flowers are expectorant and are commonly used in the form of pill for bronchitis, phthisis &c.

The leaves. **The Leaves**—The leaves are mixed with rock salt and roasted in closed vessels so that the fumes may not escape, the ashes thus produced are given with whey in ascites and enlargements of the abdominal viscera.

The powder of the dried leaves is dusted upon wounds to destroy excessive granulation and promote healthy action.

The fresh leaves warmed are used as poultice in rheumatism, gout and rheumatic artharitis to relieve painful joints and also in swellings due to Guinea-worms.

Oil. The oil in which the leaves have been boiled is applied to paralysed parts.

CAMBOGIA INDICA.

Indian Gamboge.

Official part. The Gum-resin obtained from Garcinia Morella.

Chemial Composition—Chemically Gamboge consists of a mixture of resin with 15 to 20 percent of Gum. The resin dissolves easily in alcohol forming a clear liquid of fine yellowish red hue and acid reaction. It has the formula $C_{60}\ H_{35}\ O_{12}$ (Buchner); Gamboge is readily and entirely diffusible in water forming a yellow opaque emulsion from which the resin is very slowly deposited. Its solution in alcohol is rendered opaque and bright yellow by the addition of water. Its solution in ammoniated alcohol is not disturbed by water.

Cathartic and anthelmentic.

Physiological Action—Gamboge is largely employed as hydragogue and drastic cathartic and anthelmentic. It is so very apt to produce nausea and vomitting and much griping when given in full dose that it is almost never employed except in combination with other cathartics and carminatives. In large dose, it is a violent gastro-intestinal poison and it is capable of causing fatal effects and death has resulted from a dram. The full dose is ½ to 2 grains (2 to 6 grains dose is given in U. S. Dispensatory). The anthelmentic dose in cases of tænia is from 4 to 10 grains. It ought to be administered with caution especially to children.

Therapeutics—It may be given in pill or emulsion or dissolved in an alkaline solution. It is particularly valuable in cases of anasarca and other dropsical affections and in obstinate constipation.

CATECHU NIGRUM.

Black Catechu.

Official part.

An extract prepared from the wood of Acacia Catechu, and known as "Cutch." It is without odour, and has a sweetish. astringent taste.

Chemical Composition—Contains catechu-tannic acid, catechin, catechu red, querecetin and gum. May be employed in making the official preparations for which pale catechu is directed to be used.

Astringent anaphrodisiac.

Physiological Action—Catechu is a powerful astringent, the dark coloured is somewhat more powerful than the light *i.e.* the pale variety. It is believed to be anaphrodisiac and to cause impotence when used in excess.

Therapeutics—

Dentifrice.

Externally—1. The powder applied to spongy-gums proves useful and it has been recommended as a dentifrice in combination with powdered charcoal, Peruvian bark, myrrh, areca nut burnt to charcoal, almond shell &c.

2. Sprinkled upon the surface of indolent ulcers it is occasionally beneficial and it is much used in this country for the same purpose in the form of an ointment.

Ointment.

An ointment made with lard and fine powder of catechu is useful in chronic ulceration attended with much fœtid discharge ; in obstinate cases, addition of sulphate of copper enhances its action. In prolapsus ani and protruding piles, catechu with lard and opium has been found of great service ; bathing or fomenting with an infusion of catechu is also benificial.

Powder.

As a styptic in hæmorrhage, the powdered extract has been found useful if sprinkled over the wound. It is also beneficial as a local application to primary syphilitic sores.

It is an useful application to sore nipples and as a preventive against the ill effects of nursing.

The powder is useful in otorrhœa ; it is also made into an ointment with ghee and applied to cancers.

Injection

3. An infusion of catechu may be used as an injection in obstinate gonorrhœa and it has been found highly beneficial when thrown up the nostrils in arresting epistaxis.

In throat troubles.

Internally—1. Small piece held in the mouth and allowed slowly to dissolve is an excellent remedy in relaxation of the uvula and the irritation of the fauces and troublsome cough which depends upon it.

In diarrhœa and dysentery

2. It is very useful in diarrhœa or dysentery depending on debility or relaxation of the intestinal mucous membrane but contra-indicated in inflammatory condition of the bowels or when there is disorder of the functions of the liver.

After Confinement.

3. It is supposed to have an analogous action to that possessed by ergot on the womb when prescribed with myrrh. A mixture of catechu and myrrh called Kathbol is very generally given to women after confinement as a tonic and to promote the secretion of milk.

Expectorant.

4. 1 to 4 grain dose is used as an expectorant. It is used in bronchial affection with sugarcandy and turmeric.

Anaphrodisiac.

5. It is taken in doses of from 10 to 20 grains by Hindu widows with a view of suppressing sexual desire.

Dr. R. L. Dutta notes that it is a valuable astringgent. Internally the extract with opium or other medicines is preferable in a pillular form ; dose 5 to 15 grains. The tincture is less efficacious. Externally as a gargle and as a wash it is very serviceable where an astringent is wanted. The tincture is a good application to sore

CISSAMPELOS.

Official part. The dried root of Cissampelos Pareira. No odour or bitter taste ; it is an equivalent of Pareira root.

Chemical Composition—Pilosine or Cissampeline identical with berberine, exists in the roots to the extent of ½ % and a little tannin.

Preparation ;—

1. Decoctum Cissampeli—1 in 8—Dose : ½ to 2 fl.oz.
2. Extract Cissampeli Liquidum—Dose : ½ to 2 fl. drams.

Tonic and diuretic. **Physiological Action**—It is a bitter tonic and diuretic, exercising an astringent and sedative action on the mucous membranes of the intestinal as well as genito-urinary organs.

Therapeutics—It is used by the people of Ceylon in fever and diarrhœa (Von Dorst). In nephritic diseases and inflammatory affections of the bladder and kidney the drug is very useful. It is antilithic.

Chakradatta recommends it in fever and diarrhœa and in internal inflammation. It is very useful in acute and chronic cystitis and catarrhal affection of the bladder.

Dr. W. Wright observes that the roots are black stringy and as thick as sarsaparilla, agreeably aromatic and bitter and have been ordered in nephritic disorders, in ulcers of the kidneys and bladder, in humeral asthma and in some species of jaundice. A decoction of them is used for pains and weakness of the stomach.

COSCINIUM.

The dried stem of Coscinium fenstratum. The stem has no odour ; it has a bitter taste. Official part.

Chemical Composition—Contains berberine like calumba but no starch..

Preparation—

1. Infusion Coscinii—Dose : ½ to 1 fl. oz.
2. Liq. Coscinii Concentratus—Dose ; ½ to 1 fl. dram.
3. Tinctura Coscinii—Dose ½ to 1 fl. dram.

Uses—At present the root is extensivly used in the hospitals of the Madras Presidency as an official bitter tonic and as a very good substitute for calumba. It has also antiseptic properties to a great extent and can be used in dressing wounds and ulcers. Bitter Tonic.

Moodeen Sheriff notes that "the drug is antipyretic and antiperiodic, tonic and stomachic and that it is useful in cases of continued and intermittent fever, in debility and in certain forms of dyspepsia. He further notes that it may be used in place of cinchona, gentian or calumba."

Surgeon Major D. R. Thomson says that it is a useful stomachic in diabetes.

DATURÆ FOLIA.

Datura Leaves.

The dried leaves of Datura Fastuosa, var. alba and metel. These have a characteristic odour and a bitter taste. Official part.

DATURÆ SEMINA.

Datura Seeds.

The dried seeds of Datura fastuosa, var. alba; these are without odour; they have a somewhat bitter taste.

Atropine and hyoscyamine.

Chemical Composition—The alkaloid in the seeds of datura stramonium which was up till recently known as Daturine has now been found to be a mixture in varying proportions of atropine and hyoscyamine. According to Lyon's researches it would seem that the alkaloidal strength of the seeds and leaves is much the same and should this fact be established as the result of further work upon this subject, we should recommend that this tincture like those of henbane and belladonna be prepared from the leaves, as the latter is a more elegant pharmaceutical product than that of the seeds.

This tincture like those of henbane and belladonna readily admits of standardisation.

Preparation—Tinctura Daturæ Seminum: Dose 5 to 15 Minims.

Equivalent of Belladonna.

Physiological Action—Datura when taken either in small or large doses produces symptoms which are precisely similar to those caused by belladonna. Like belladonna, datura chiefly depends for its therapeutic powers upon 1st, its sedative action upon the peripheral nerves, 2nd, its stimulating action upon the respiratory centres and 3rd, its influence upon the heart and vasomotor centres. By virtue of its first mentioned power it is useful in spasmodic diseases such as whooping cough,

Antispasmodic.

dysmennorrhœa, and local spasm. As atropine has some influence upon afferent nerves it has some power of relieving pain, but for this action to be marked, direct application is necessary *e.g.* emplastrum or extract. On account of the paralysing influence which it has on the inhibitory intestinal nerves the extract may be used as an adjunct to more decided laxatives.

Sedative.

As the alkaloid is eliminated by the kidneys it produces increased diuresis but in cases of poisoning there is retention of urine from paralysis of bladder.

As it also contains a large amount of hyoscyamine it is therefore used to relieve pain, procure sleep or quiet irregular nervous action and is not supposed to exercise any specific curative influence over particular diseases.

Therapeutics—*Dr. Waring* notes that the tincture was employed in hospital practice in India and it was found to produce all the sedative and narcotic effects produced by opium. So it is an useful and cheap substitute for opium, 20 drops of tincture being equal to 1 grain of opium.

This drug is highly spoken of in the treatment of insanity and painful headache which often proceeds epilepsy and mania. It procures sleep in cases of acute mania. It is very useful in cases of neuralgia and rheumatic affections, dysmennorrhœa, syphilitic pains, cancerous sores and spasmodic asthma.

Hypnotic.

Dr. Waring mentions of a case of sciatica which obtained great relief from ⅛th grain extract to 1 grain.

The active principle daturine, has been proposed in place of atropine and used for ophthalmic purposes as

Guttæ Daturinæ $\frac{1}{2000}$th grain with gelatine in London Royal Ophthalmic Hospital.

Mydriatic.

The effect of the administration of datura is to dilate the pupil ; should it become very large and dilated, this may be taken as a sign that the medicine has been carried as far as it can be with safety, whether it has produced its other effects or not (*Waring's Bazar Medicine of India*).

Waring recommends it to be used in traumatic tetanus when better remedies are not procurable.

Leaves—The leaves are useful as a local application in rheumatism.

Juice.

The concentrated juice of the leaves is prescribed in mumps as a local application and has a marked effect in reducing the swelling and tenderness.

Poultice.

The leaves of this plant are boiled, made into a poultice and applied locally to boils and abscesses to relieve pain and hasten suppuration. This poultice is also useful in cases of Guinea-worms. It is also a favourite method of arresting the secretion of milk in cases of painful breasts.

Plaster.

The plaster made from extract of the seeds and poultice of the leaves are effectual local anodynes in cases of nodes and rheumatic enlargement of joints, painful tumours or external piles. The plaster is frequently used on the chest in asthma and other pulmonary affections but neither should be applied to ulcerated surfaces owing to the risk of absorption of the poison.

The dried leaves are smoked to relieve the urgent symptoms of spasmodic asthma, dyspnœa of phthisis, emphysema of the lungs and even in chronic catarrh.

The dried root and the lower part of the stem might as well be smoked with leaves (to prepare the roots for use they are quickly dried, cut into pieces and beaten so as to loosen the texture). The smoke produces a sense of heat in the lungs followed by copious expectoration and attended frequently with temporary vertigo or drowsiness and sometimes with nausea. The remedy should not be used in plethoric cases unless preceded by ample depletion, nor in cases where there is determination to the head. Dangerous and even fatal consequences have resulted from its incautious or improper uses. Fumigation.

This is used externally as an ointment, with great advantage in irritable and painful hæmorrhoids. Ointment.

The seeds are employed by hakims in impotence. Seeds of 15 fruits dried and powdered, are well boiled in 10 seers of cow's milk; out of this milk as much ghee is made as possible; this ghee is believed to contain strong aphrodisiac properties and is rubbed on the genitals twice a day to stimulate them and 4 grains of the ghee is given internally once a day. Seeds as aphrodisiac.

EMBELIA.

The dried fruit of Embelia Ribes and Embelia Robusta. Taste: slightly astringent and aromatic. It is an equivalent of "Kousso" and "Male Fern." Official part.

Composition—Active principle is "Embelic acid."

Dose in powder: 1 to 4 drams.

Physiological Action—*Susruta* describes the seeds

Anthelmentic.

as an anthelmentic, alterative and tonic and recommends their use along with liquorice root for the purpose of strengthening the body and preventing the effects of age. Later writers regard Baberang as carminative, stomachic and anthelmentic and useful in intestinal worms, dyspepsia and skin diseases. The berries enter into composition of several applications for ringworm and other skin diseases. It is also a very valuable anthelmentic against tapeworms.

Mode of administration.

Therapeutics—*Dr. Harris* recommends 1 to 4 drams of pounded seeds with milk or curds to be taken early in the morning fasting, followed by a dose of castor oil ; the worm is expelled dead. It can be repeated every morning, if necessary ; no ill effects follow its use. A teaspoonful of the powder might be given to children in case of tapeworms, twice a day. The taste is rather pleasant, slightly astringent and faintly aromatic.

It is a common practice to put a few berries of the plant in the milk and give to young children in order to prevent flatulence.

Embelic acid and its salts.

Embelic Acid—$C_9H_{14}O_2$—insoluble in water and is not decomposed when boiled with dilute sulphuric or hydrochloric acid ; salts of embelic acid, with soda, potash ammonia, have been prepared. The ammonium salt is most readily obtained in large needle-shaped crystals of a foxy red hue. This ammonium salt is an effective anthelmentic against tænia, in doses of 3 grains for children and 6 grains for adults. It would act in cases in which ordinary tæniacides fail. The best method is to give it with honey or simple syrup, the drug being preceded and followed by castor oil. This is tasteless and so has a decided advantage over male fern and is an useful addition to the Materia Medica.

GOSSYPII RADICIS CORTEX.

Cotton Root Bark.

The dried root bark of Gossypium herbaceum. It is inodourous and has a slightly acrid and astringent taste. Official part.

Composition—The root bark contains resin and a fixed oil with traces of tannin, sugar and starch.

Preparations—

1. Decoctum Gossypii Radicis Cortex: dose ½ to 2 fl. oz.
2. Extract Gossypii Radicis Corticis liquidum: dose ½ to 1 fl. dram.

Physiological Action and Uses:—It is an equivalent of ergot. It acts like ergot by promoting uterine contraction. It is useful in dysmennorrhœa and supression of menses when produced by cold. It is an excellent emmenagogue. It is said to promote uterine contraction with as much efficacy and more safety than ergot. Ecbolic.

Dr. Bonchelle of Mississipi states that it was habitually resorted to by the slaves of the south for producing abortion. To assist labour he employs the decoction in wineglassful doses every 20 or 30 minutes (4 oz. of bark boiled in a quart of water to one pint).

Dr. Garryness asserts that the cotton root has great power in arresting hæmorrhage and ameliorating the other symptoms of uterine fibroids. Also useful in ammennorrhœa, chlorosis and dysmenorrhœa.

Other parts of the Plant—Eastern physicians consider all parts of the plant to be hot and moist.

Flowers. **Flowers**—A syrup of the flower is prescribed in hypochondriasis on account of its stimulating and exhilarant effects; a poultice of them is applied to burns or scalds.

Leaves. **Leaves**—The juice of the leaves is considered a good remedy in dysentery and the leaves with oil are applied as paste to gouty joints. Hipbath of young leaves and root is recomended in uterine colic and the leaves are used as a vapour bath for the anus in cases of tenesmus.

The herbaceous part of the plant contains much mucilage and has been used as demulcent.

Seeds. **The Seeds**—Yield by expression a fixed oil of the drying kind which is employed in making soap and for other purposes. Cotton seeds have been employed in the southern states of the United States with great success in the treatment of intermittent fevers.

Ainslie states that the seeds in the form of an emulsion are given in dysentery and are supposed to be pectoral.

The oil has also the peculiar property when externally applied of clearing the skin of spots and freckles.

GUMMI INDICUM.

Indian Gum.

A gummy exudation from the wood of Anogeissus lactifolia. Official part.

Character—The gum usually occurs in rounded or vermiform pieces, sometimes in elongated tears, colour ranging from amber-brown to pale yellow or colourless. The surface is roughened and opaque, it has a glassy fracture and is quite transparent internally and free from cracks. With water it forms a nearly colourless mucilage with the finer qualities of the gum, posses ing a faint characteristic odour and about double the viscosity of gum Arabic, treated with the same proportion of water. Its dull white roughened surface and glassy fracture free from cracks, distinguish it from all other gums. The finer qualities are well suited for use in pharmacy and for the preparation of emulsions it is unrivalled.

As it possesses double the viscocity of gum Arabic, one part of this gum, should be used, where two parts of the former are ordered.

Preparation—Mucilago Gummi Indici.

Properties—Demulcent and emmollient. Chiefly used as an adjunct to other medicines and especially for the purpose of suspending heavy powders. Demulcent.

Therapeutic Uses—In cattarhal affections, pulmonary irritation, in irritable states of the genito-urinary system, in diarrhœa &c., it proves a valuable auxiliary to other remedies.

N. B.—In India, Indian gum may be employed in making the official preparations, for which gum acacia is directed to be used and one part of Indian gum is taken for every two part of gum acacia.

HYGROPHILA.

Official part.

The dried herb, including the root of Hygrophila Spinosa.

Chemical Composition—Contains an alkaloid "Cholesterol," inorganic salts, fixed oil and mucilage. The decoction contains a considerable quantity of potassium chloride and sulphate on the presence of which the diuretic action of the drug depends.

Preparation—

1. Decoctum Hygrophilæ :—Dose ½ to 2 fl. oz.

Demulcent.
Diuretic.

Physiological Action—It is demulcent and diuretic.

Therapeutics—The Hindus consider hygrophila to be cooling, diuretic and strengthening. The roots, seeds and ashes of the plant are in general use and prescribed in hepatic obstruction with dropsy, rheumatism, and urinary affections. In dropsical cases, it possesses undoubted diuretic properties. It has been used with great success in cases of catarrhal jaundice.

In jaundice.

The Mahomedans consider the seeds to be aphrodisiac and the seeds are found almost in every bazar to be sold for the above purpose. Dose of the seeds : one to three drams, with sugar, milk or wine.

Seeds.

The ashes of the dried burnt plant, in doses of ½ to 1 teaspoonful, twice or thrice daily, is given as a diuretic in hepatic dropsy.

Ashes.

The different parts of the plant appear to have the following therapeutic action :

1. The seeds are demulcent, diuretic and possibly tonic and are therefore indicated in diseases of the genito-urinary tract.

2. The roots are cooling, bitter, tonic and diuretic.

3. The leaves cooling and diuretic.

ISPAGHULA.

The dried seeds of Plantago ovata. These possess neither odour nor taste. Official part.

Chemical Composition—Mucilage is so abundantly yielded by the seeds that one part of them with 20 parts of water forms a thick tasteless jelly. On addition of a large quantity of water and filtering, little mucilage passes, the majority adhering to the seeds. The mucilage, separated by straining with pressure, does not redden litmus, is not affected by iodine, nor precipitated by borax, alcohol or ferric chloride (Pharmacographia); a fatty oil and albuminous matter also exist in the seeds.

Dose 50 to 150 grains.

Physiological Action—The seeds are demulcent; Demulcent. when they are exhibited whole, in their passage through the intestines, they absorb as much fluid as makes them swell and, by the time they reach the central and lower portion of the canal, they give out a bland mucilage and in general they continue to possess the same mucilaginous properties. If the bowels be made confined by an anodyne enema and by using a small quantity of food, the mucilaginous properties of the seeds are most evident.

The roasted seeds have an astringent effect.

Therapeutics—*Externally*—The crushed seeds, made into a poultice with vinegar and oil, are applied to rheumatism and gouty swellings; with cold water, these form a good emollient poultice. A cooling lotion for the head is prepared from the mucilage. Poultice made with these seeds are used for unhealthy ulcers, sores and sinuses. (*Civil Surgeon J. H. Thornton*)

Poultice.

Cooling lotion.

Internally—As the seeds are cooling and demulcent, they are chiefly employed in diarrhœa, dysentery and other inflammatory and functional derangements of the digestive organs and fever.

In diarrhœa and dysentery.

Dr. Joubert notes: "A valuable remedy in the treatment of chronic dysentery. I have used it largely with good results and can bear personal testimony to its efficacy. I used it in spoonful doses of the whole seed, steeped for 15 or 20 minutes in water, the resulting mucilaginous mass being swallowed. Many of the swollen seeds pass out whole with the motion and I believe their action to be mechanical as well as astringent to the intestinal ulcers. I have used it largely for dysentery and chronic diarrhœa, in both Europeans and natives and consider it a very valuable medicine."

A decoction of the seeds is prescribed in cases of cough and cold. The mucilage forms a demulcent and soothing drink in gonorrhœa, removes the heat and scalding during micturition (most efficacious when taken as sherbat with sugar-candy).

It is also diuretic and useful as an internal remedy for piles.

2 to 3 drams of the seeds, moistened with hot water and mixed with sugar-candy, are given in dysentery and irritation of the bowels.

Astringent.

The roasted seeds having a mildly astringent action are useful in irritation of the bowels of children and in dysentery.

KALADANA.

Official part.

The dried seeds of Ipomœa hederacea. The seeds have an acrid taste and an earthy odour. Dose in powder 30 to 50 grains.

Chemical Composition—The active principle is a resin, contained in the seeds about 8·2 % ; it is known as Pharbitisin and has a nauseous acrid taste and an unpleasant odour, especially when heated. This resembles the ether-insoluble portion of jalap resin.

Dose 2 to 8 grains.

Kaladana Resin.

Pharbitisin or Kaladana Resin.—It is sweetish and acrid to the throat, easily soluble in alcohol (90%); practically insoluble in benzol, ether, chloroform or carbon bisulphide. It melts at about 160°C. The powdered resin yields little or nothing to boiling water.

Preparation—1. Pulvis Kaladanæ Compositus—Compound powder of Kaladana.—Kaladana 5 ; Acid

Potassium Tartrate 9; Ginger in powder 1; Dose 20 to 60 grains.

Drastic purgative.

Physiological Action—It is a drastic purgative and attenuant, relieving the system of bilious and phlegmatic humours and acting as an anthelmentic. It closely resembles jalap in properties and uses.

Therapeutics—It is applicable in most cases, in which an active cathartic is required and from its hydragogue powers, is especially adapted in the treatment of dropsy. It is generally given in connection with medicines which assist and qualify its operations *e.g.* Pulvis Kaladana Co. With calomel it forms a cathartic compound which is very useful in bilious fevers and other fevers attended with congestion of the liver or portal circle. In over-doses, it may produce dangerous hypercatharsis,

MYLABRIS.

Official part.

The dried beetle Mylabris phalerata. This and other species have been highly extolled as a substitute for cantharides.

Preparation—Emplastrum Calefaciens Mylabridis—Warming plaster of Mylabris.

Vesicant.

Physiological Action and Use—The action of these insects is the same as that of the well-known cantharides for which they afford a very efficient substitute as a vesicant.

According to the Indian Pharmacopœia "these should not be substituted as an internal remedy for the tincture of cantharides, since the strength and operation of the latter is well ascertained, which is not the case with the Indian article."

Dr. Bolly Chand Sen notes the above "as good as cantharides, perhaps stronger."

MYROBALANUM.

Myrobalans.

Official part.

The dried immature fruits of Terminalia Chebula usually distinguished in commerce as Chebulic myrobalans.

Varieties.

Varieties and Description—Three varieties of myrobalans are known, which are entirely distinct from each other :—

(1) Chebulic—Haritaki.
(2) Beleric—Bahera.
(3) Embelic—A'mlaki.

The three varieties together are known as "Tri-phalá."

The Indian writers describe seven varieties of Haritaki or Chebulic myrobalans, which, however, are nothing more than the same fruit in different stages of maturity. Only two varieties are now recognised in medicine :

Mature myrobalans.

(1) The mature myrobalans—of an ovoid form 1 to 1½ inches long ; sometimes tapering towards the lower extremity, obscurely 5 or 6 sided, more or less

brown epidermis, within which is an astringent pulp enclosing a large bony endocarp (the mature Haritaki).

Unripe myrobalans.

(2) The unripe fruits are shrivelled, black, ovoid, brittle bodies from ⅓ to ¾ of an inch in length, having a shining fracture and an astringent taste; on careful examination, the rudiments of the nut may be distinguished. This variety has only been made official. No odour, taste astringent.

Dose in powder ½ to 1 dram.

Chemical Composition—Contains gallo-tannic acid, gallic acid, resins (green and brown) and mucilage. The tannin found amounts to 20 to 20.6%, a lower percentage, than that quoted by other investigators who give an average of tannin in Myrobalans from 20 to 40%. The soft green resin is presumably the "Myrobalanin" of Dr. Apery.

Preparation—Only two unguenta—

Ointments.

1. Unguentum Myrobalani.
2. Unguentum Myrobalani cum opio.

These are substitutes for the official gall ointment and unguentum gallæ cum opio; and are only used externally as an astringent.

Purgative and astringent.

Physiological Action and Uses—It is a purgative and astringent. It purges in a different manner from cassia, manna or such like drugs, but it does it by astrition or binding. It is quite possible that its action may be that of a nervomuscular stimulant, like nux vomica, certainly the most valuable class of purgatives in the treatment of Indian diseases. This quality, combined with its astringency, would render it valuable for diarrhœa and dysentery.

Chebulic myrobalans are described as laxative, stomachic, tonic and alterative. They are used in fevers, cough, asthma, urinary diseases, piles, intestinal worms, chronic diarrhœa, costiveness, flatulence, vomitting, hiccough, heart disease, enlarged spleen and liver, ascites and skin diseases. In combination with Embelic and Beleric myrobalans, under the name of "Triphalá" or the 3 myrobalans, they are extensively used as adjuncts to other medicines in almost all diseases.

Alterative.

As an alterative tonic, promoting strength, preventing effects of age and prolonging life, chebulic myrobalan is used in a peculiar way. One fruit is taken every morning with salt in the rainy season, with sugar in autumn, with ginger in the first half of the cold season, with long pepper in the second half, with honey in spring and with treacle in the two hot months. (*U. C. Dattà : Hindu Materia Medica*)

As a purgative.

Six chebulic myrobalans, bruised and given in decoction, act efficiently and safely as a purgative, producing 4 or 5 copious stools, unattended by gripings, nausea and ill effects. The addition of a little cinnamon renders the medicine more palatable.

Astringent lotion.

These also contain a large amount of astringent principle and so are used as substitute for galls in lotions and injections. A decoction of them is serviceable in bleeding piles and in some vaginal discharges (*Dr. Oswald*). *Ainslie* notices their use as an application very favourably of the immature fruit as a tonic and aperient in enlargements of the abdominal viscera.

More recently, the authors of the Pharmacographia Indica add their evidence that they have found it useful in diarrhœa and dysentery.

Till recently *Dr. M. P. Aprey* has brought to the notice of the profession in Europe the value of this drug in dysentery and choleric diarrhœa; he administers it in pills of 25 centigrams each, dose being from 4 to 12 pills or even more in 24 hours.

OLEUM AJOWAN.

Ajowan Oil.

Synonym.—Ptychotis oil.

Official part. The oil distilled from the fruit of Carum copticum. It is colourless, with an odour and taste resembling thyme.

Composition—The fruits yield on distillation 4 to 4·5 °/ₒ of the oil. Specific gravity ·917 to ·930. It contains thymol, cymene and terpene, boiling at 172°C. When the oil is distilled, there collects on the surface of the distilled water a crystalline substance. This crystalline substance or Ajowan-ka-phul is identical with thymol. If a portion of the oil is cooled, it should yield from 30 to 36 per cent of crystalline thymol.

Dose of the oil: 2 to 3 minims.

Carminative and Stimulant. **Physiological Action**—Valuable stimulant, carminative and antispasmodic.

Therapeutics—In flatulence, flatulent colic, atonic dyspepsia and diarrhœa, it is a remedy of much value. It produces a feeling of warmth and exhilaration and relieves the sinking and fainting feeling which accompanies bowel disorders.

The Seeds.

The Seeds—In native practice, the seeds are much valued for their antispasmodic, stimulant, tonic and carminative properties. "They are considered to combine the stimulant quality of capsicum or mustard, with the bitter property of chiretta and the antispasmodic virtues of asafœtida." (*Waring's Bazar Medicine*) They are administered in flatulence, flatulent colic, atonic dyspepsia and diarrhœa and are often recommended for cholera. They are used most frequently in combination with rock-salt, asafœtida, myrobalans. They also check discharge of a chronic nature and are therefore used in making lotions, collyria, &c.; upon the same principle, they are prescribed in bronchitis with copious expectoration.

Poultice.

A plaster or poultice of the crushed fruit is said to relieve pain. *Dr. Bidie* is strongly in favour of the extended use of this medicine. "As a topical remedy, it may be used with advantage, along with astringents in cases of relaxed sore-throat. For disguising the taste of disagreeable drugs and obviating their tendency to cause nausea and griping, I know of no remedy of equal power."

As a source of thymol.

The seeds have come into special notice in England and Germany for the manufacture of thymol, enormous quantities of which are now made and used as an antiseptic (*Smith*).

Aqua Ptychotis.

The *arak* or distilled water of Ajowan, known as Omum water, is prepared and sold as Aqua Ptychotis; it is used as a carminative. "In cholera, much reliance is placed by the natives and Anglo-Indians on omum water, and although it appears to have no claim to the character of a specific in that disease, which popular opinion assigns to it, there can be little doubt that it exercises considerable power, specially in the early stage, of checking diarrhœa and vomitting and at the same time stimulating the system. It is not to be trusted alone, but forms an admirable adjunct to other remedies. In habitual drunkenness and dipsomania, omum seems worthy of trial." (*Waring's Bazar Medicine*)

OLEUM ARACHIS.

Arachis Oil.

Synonym—Earth-nut oil, Ground-nut oil, Pea-nut oil.

Official part.

The oil expressed from the seeds of Arachis hypogœa without the aid of heat.

Chemical Composition—The oil consists of the glycerides of four different fatty acids; the chief of these is oleic acid $C_{18}H_{14}O_2$ with which are associated hypogæic acid $C_{16}H_{30}O_2$, palmitic acid $C_{16}H_{32}O_2$ and arachidic acid $C_{20}H_{40}O_2$.

The seeds yield about 45 per cent. of oil.

Substitute for olive oil.

Uses—Arachis oil forms a good substitute in pharmacy for olive oil. It has now almost entirely superseded olive oil in India both for pharmaceutical and other purposes. It is well adapted for the preparation of ointments and plasters (90℔ of oil and 41℔ of oxide of zinc are necessary for making good plaster).

It is useful in catarrh of the bladder.

OLEUM GRAMINIS CITRATI.

Oil of Lemon Grass.

Synonym—Indian oil of Verbena.

The oil distilled from Andropagon citratus. **Official part.**

Chemical Composition—Contains citral, citronellal, methyl heptanone, geraniol and probably linalol. It is a dark yellow oil, having an odour resembling that of Verbena.

Dose :—½ to 3 minims in sugar or in emulsion. For external application, it should be diluted with twice its bulk of any bland oil or soap liniment.

Stimulant.

Physiological Action—Locally, it is a rubefacient, internally it is stimulant, carminative, antispasmodic and diaphoretic.

In Rheumatic affections.

Therapeutics—It is an useful application in chronic rheumatism. The Lemon grass oil applied with prolonged friction is an useful and pleasant application in lumbago. It forms an excellent embrocation in neuralgia, sprains and other painful affections.

In ringworm.

Externally, it is used for ringworm. The oil is used to cover the smell of iodoform in the dispensary of the Royal Infirmary of Edinburgh.

In flatulence.
In Cholera.

Internally—In flatulent and spasmodic affections of the bowels and gastric irritability, it is a valuable remedy. In cholera, it proves serviceable not only by allaying and arresting the vomiting, but by aiding the process of reaction. It is also diaphoretic and stimulant.

Leaves.

Other Parts of the Plant—The infusion of the leaves is largely used as an agreeable sudorific in mild cases of fever, especially in weakly subjects or when the fever is of the typhoid type.

It acts as a diaphoretic, stimulant and antiperiodic. "An infusion of it, as a fever drink, has great effect in inducing a remission or intermission by bringing on sweat." The vapour of a hot infusion is inhaled by fever patients to produce diaphoresis.

The root and tender leaves are sometimes given with black pepper in cases of disordered menstruation and in congestive and neuralgic forms of dysmenorrhœa.

OLEUM GYNOCARDIÆ.

Gynocardia Oil.

Synonym—Chaulmoogra oil.

The fatty oil expressed from the seeds of Gynocardia odorata.

Chemical Composition—The oil has got a decided acid reaction, its melting point is 42°C ; it contains no alkaloid, and its chief constituents are :—

1. Gynocardic acid 11·7 per cent.

2. Palmitic acid 63 per cent.
3. Hypogæic acid 4 per cent.
4. Cocinic acid 2·3 per cent.

The acids exist in combination with glycerol as fats and the two former in the free state as well. The acrid burning taste of the oil is stated to be due to the first-mentioned acid.

Preparation—Unguentum Gynocardiæ 1 in 10 of hard and soft paraffin.

Alterative.

Physiological Action—The oil is alterative and tonic internally and stimulant externally; over-dose causes vomitting and purging with loss of appetite but every one is not equally affected by the drug.

It is also absorbed through the skin by inunction.

Therapeutics—

In facial eczema.

Externally—Principally employed in the treatment of leprosy and skin diseases *viz.* psoriasis, eczema, &c. It is also said to be rubbed against bruises, sprains, rheumatism and stiffness. In eczema of the face, when it shows itself by dry patches, an ointment of gynocardic acid, 15 to 20 grains to an ounce of vaseline, is almost a specific, when most of the ordinary useful applications only serve to aggravate the local mischief.

The ointment should be applied 3 or 4 times a day so as to keep the affected parts lubricated with it. In eczema of the head, it is also a very useful application. In acute forms of this disease, when there is much discharge, the good effects following its use are not so marked.

In chronic rheumatism, neuralgia and sciatica, it is used mixed with camphor and chloroform or with an equal weight of saturated solution of menthol in chloroform and then rubbed over the painful part.

Innunction. The tonic and alterative virtues of this oil might also be obtained by external application with friction; it has been rubbed round the chest and on the abdomen in cases of struma, tabes mesenterica and phthisis pulmonalis.

Internally—It is alterative and tonic. In the *Indian Annals of Medical Science, April 1856*, it was brought to notice as a remedy for secondary syphilis. It was first given as a remedy for phthisis and scrofula by *Dr. Jones* of Calcutta in doses of 6 grains thrice daily. *Dr. Young* of Florence has used this oil with advantage in macular and anæsthetic leprosy. *Hon. Surgeon Moodeen Sheriff* notes, that if the disease (*i.e.* leprosy) be slight and of short duration, the beneficial influence of the oil is remarkable and rapid; but if severe and of long standing, no improvement takes place under its use, until it is persisted in for months or years. It is useful in all forms of leprosy (tubercular, anæsthetic and mixed) but the first-named variety, is the one most benefitted by it. The internal use of the oil should always be assisted by its external application to the affected parts. If used alone externally, it proves itself too strong in some cases and excoriates the tender diseased parts or renders the ulcers irritable and painful and I have generally employed it in combination with neem oil (1 to 2 or 3). It is also very useful in lepra vulgaris, psoriasis and tertiary syphilis.

In Leprosy.

The oil is best taken floating on water or milk. The dose is from 5 to 15 drops or more (gradually increased) 3 or 4 times in 24 hours. If it produces nausea, vomitting or looseness of bowels, it should be stopped for one or two days and recommenced in somewhat smaller doses. Patients taking this medicine should live generously, as a weakly and under-nourished person is said to be specially liable to the bad effects of the drug."

It is also used internally as a tonic and alterative in scrofula, phthisis, lupus and marasmus. *Dr. Murrell* notes that in phthisis it acts as an expectorant, the cough becomes less troublesome and finally a gradual improvement in the general symptoms occurs. Best results are obtained when the internal administration is associated with the external application by rubbing.

In phthisis.

Dr. Wyndham Cottle writes in the B. M. J. on chaulmoogra oil and its active principle, gynocardic acid, as internal and external remedies in various forms of skin diseases. Gynocardic acid is preferable for several reasons as it rarely produces nausea and can easily be given in the form of pill and is more uniform.

Gynocardic acid.

Mode of administration—The oil might be given as pearles or emulsion or suspended in milk or water. It is convenient to have the gynocardic acid made into pills, containing ½ grain of the acid with 3 grains of extract of gentian or extract of hops or confection of roses. To commence, one such pill may be given thrice daily. The number may be gradually increased to 3 or 4 pills for each dose.

Mode of administration.

As a soap. As the constitutional effects of the drug may be produced by innunction, a soap in which gynocardic acid is incorporated would possess much of the soothing and remedial influence of the gynocardic acid and prove useful in many forms of skin disease.

OLEUM SESAME.

Sesame Oil.

The oil expressed from the seeds of Sesamum indicum.

Chemical Composition—Contains glycerides of oleic, myristic, palmitic and stearic acids and also a resinous compound.

A substitute for olive oil. **Uses**—It is demulcent and may be employed in making the official liniments, ointments and plasters, for which olive oil is directed to be used.

PICRORHIZA.

Official part. The dried rhizome of Picrorhiza kurroa. It has no odour and has a very bitter taste.

Composition—Contains the bitter glucoside "Picrorhizin" 14·96 %—which yields Picrorhizetin and glucose on hydrolysis; other constituents are cathartic acid 9·33, another organic acid, together with wax and gum.

Dose in powder—10 to 20 grains as a tonic,
40 to 50 grains as an antiperiodic.

In large doses *i.e.* from two to four drams, it is cathartic.

Preparation—

1. Extract Picrorhizæ Liq—Dose 20 to 60 minims.
2. Tincture Picrorhizæ—Dose 30 to 60 minims.

Physiological action—In small doses, it is digestive, bitter, dry, aperient and antiperiodic. In large doses (repeated) it is a hydragogue cathartic.

In dyspepsia.

Therapeutics—It is a favourite remedy in dyspepsia (bilious), accompanied by fever and is given daily in decoction with liquorice, raisins and neem bark (*Chakradutta*).

As antiperiodic in fevers.

Hon. Surgeon Moodeen Sheriff, notes that "it is a very good stomachic and very useful in almost all forms of dyspepsia and in nervous pain of the stomach and bowels."

Antiperiodic virtues are assigned to it by *Dr. Tripe* and later by *Moodeen Sheriff and Dymock.* Thus *Dymock* notes "I can state from personal observation, that it is used successfully as antiperiodic in native practice in Bombay ; its slight laxative action, is rather beneficial than otherwise."

It is specially indicated in cases of constipation, where the bowels are costive due to deficient secretion.

Surgeon Major D. R. Thompson notes that if a strong decoction of the drug be given 3 or 4 times a day in cases of dropsy, copious watery evacuations are discharged and the dropsical effusion is relieved. In some cases, the medicine must be continued for about a week, to bring about the desired result.

It is prescribed as a laxative for children suffering from worms.

It is best administered with aromatics. Two drams of the powdered roots given with sugar and warm water act as a gentle aperient.

PODOPHYLLI INDICI RHIZOMA.

Indian Podophyllum Rhizome.

Official part.

The dried rhizome and roots of Podophyllum Emodi. It has a very faint odour and a bitter acrid taste.

Indian *Vs.* American plant.

Chemical Composition.—The rhizome of the Indian species—Podophyllum Emodi, is an active cathartic, which has been found by Dymock and Hooper to yield 12% of resin. As this resin, contains over 56% of podophyllotoxin the Indian plant should be much more active than American, which ordinarily yields only about 5% of resin, containing 40 to 45% of podophyllotoxin.

Mr. J. C. Umney, laterly showed in August 1892, that the physiologically active portion of podophyllum resin, consists of podophyllotoxin, which is composed of picropodophyllin, held in solution by picropodophyllic acid.

Picropodophyllin is a neutral crystalline principle, which, though the sole active ingredient of the resin, is inactive in its free state, owing to its insolubility, but in combination with, or more probably solution in, picropodophyllic acid is extremely active. The resin also contains an inactive acid—podophyllic acid, a yellow colouring matter—podophylloquercetin, and fatty matter.

Mr. Umney concludes his paper by saying that the rhizome of Podophyllum Emodi, yields nearly double the amount of resin, yielded by P. Peltatum, but the resin contained only half the quantity of crystalline picropodophyllin, to which the value as a cathartic is due.

Preparation—Podophylli Indici Resina—prepared from Indian Podophyllum Rhizome.

Dose ¼ to 1 grain.

Cholagogue and Cathartic.

Physiological action and uses—Podophyllum is a slow but active and certain cathartic, producing copious watery discharges often with much griping. It is also a very efficient cholagogue and the experiments of *Prof. Rutherford* upon dogs confirm this. It is largely employed in bilious fevers and hepatic congestion and as a general cathartic. In over doses podophyllum acts as an irritant poison, the symptoms are vomitting and purging followed by coma.

SAPPAN.

Official part.

The heart wood of Cæsalpinia Sappan. The wood has no odour, and only a slightly astringent taste.

Chemical Composition—It is astringent, contains sappanin, a red colouring matter, resembling hæmatoxylin and Brazilin; also tannic and gallic acids. It is an equivalent of logwood.

Preparation.

Decoctum Sappan—Dose ½ to 2 fl. oz.

Uses—Chiefly used as a dye, instead of logwood. The decoction is used to heal wounds and stop hæmorrhage from lungs. It is also a very powerful emmanagogue.

It has been used as an astringent tonic in atonic diarrhœa and in diarrhœa of phthisis.

TINOSPORA.

Official part. The dried stem of Tinospora Cordifolia—collected in the hot season, when the bitter principle is most abundant. No marked odour, bitter taste.

Chemical Composition—Contains (1) Berberine (2) a bitter glucoside which can not be crystallised (3) a starch (known as gilœ-ka sat)

Preparation—1. Infusion Tinosporæ-Dose 1 to 2 fl. oz.

2. Liq. Tinosporæ Concentratus : Dose ½ to 1 fl. dram.

3. Tinctura Tinosporæ-Dose ½ to 1 fl. dram.

Physiological action—Tonic antiperiodic, diuretic and alterative.

Therapeutics—In mild cases of intermittant fevers, in general debility after fevers and other exhausting diseases, in secondary syphilitic affections and in chronic rheumatism, it has been used with good results. In malarial fevers, it is sometimes more efficacious than quinine. It is credited with aphrodisiac properties.

The fresh plant is said to be more efficacious, when taken with milk in cases of rheumatism, acidity of urine and dyspepsia.

Starch or Giloe-ka-sat—it is prepared by powdering the stem and washing out the starch with water, the latter retains a little of the bitterness of the drug.

It is an excellent remedy in urinary affections and gonorrhœa, it is also esteemed as a tonic in convalescence after fevers, splenic affection, &c.

The *palo* is to be taken with sugar, milk or rice gruel. Dose ½ to 1 dram.

TODDALIA.

Official part.

The dried root-bark of Toddalia aculeata. It has a faint aromatic odour and an aromatic pungent bitter taste.

Chemical composition—The bark contains a resin and an essential oil, having a cinnamon and mellissa like odour and also a bitter principle, probably an alkaloid with antipyretic properties.

Preparations—1. Infusion Toddaliœ Dose 1 to 2 fl. oz.

2. Liquor Toddaliæ concentratus—Dose ½ to 1 fl. dram.

Physiological action—Aromatic tonic, stimulant and carminative; antiperiodic? It is comparable to official Cusparia.

Therapeutics—In constitutional debility and in convalescence after febrile and other exhausting diseases, it is apparently a remedy of great value.

Other parts of the plant—Every part of the plant has a pungent bitter taste and a pleasant aroma, but these are most marked in the root, which is the official part.

The fruit and root is rubbed down with oil, to make a stimulant application for rheumatism.

TURPETHUM.

Official part.

The dried root and stem of Ipomœa Turpethum. The drug has a faint odour and a nauseous taste, which is perceptible only after it has been sometime in the mouth.

Dose in powder 5 to 20 grains, one to two drams may be given as decoction.

Chemical composition—Examined by M. Boutron Charland, it was found to contain a resin, a fatty substance, volatile oil, albumen, starch, yellow colouring matter, lignin, salts and ferric oxide. The roots contain 10% of resin.

The Resin, its characters.

According to M. Spirgatis, the resin is a glucoside, turpethin "$C_{34} H_{56} O_{16}$, like that of other Convolvulaceæ, insoluble in ether, but soluble in alcohol, to which it imparts a brown colour, not removeable by animal charcoal. The resin is inflamable, burning with a smoky flame and emitting irritant vapours. It is brown ish and yielding on pulverisation, a grey powder, which strongly irritates the mucous membrane (United States Dispensatory). Under the action of alkaline bases, it is transformed into Turpethic acid ($C_{34}H_{60}O_{18}$) and by hydochloric and other dilute acids, it is decomposed into Turpetholic acid ($C_{16}H_{32}O_4$) and glucose (Watt's Dictionary.)

Preparation—Tinctura Jalapæ Composita-Jalap 80 ; Scammony 20 ; Turpeth 10 and alcohol up to one pint.

Dose ½ to 1 fl. dram.

Hydragogue Cathartic.

Physiological action—Turpeth, when administered by the mouth, excites irrtation of the stomach with nausea, colic and watery mucous stools; in excessive doses, it excites inflammation of the gastro-intestinal mucous membrane and bloody dejections. Like jalap, it is a hepatic stimulant, increasing the secretion of biliary matter and rendering it more watery.

In dropsy.

Therapeutics—Being a hydragogue cathartic, it is useful for the removal of dropsical effusions and in such cases, it acts best in combination with ginger and bitartrate of potash. As this is quite equal to jalap and superior to rhuberb in its action, it is preferable to both, having no nauseous smell or taste and for being a very efficient and satisfactory purgative, when used alone. The dose is somewhat larger than that of jalap, but this is no disadvantage as long as it is safe and free from nauseous taste and smell.

In the *Nighantas*, it is described as pungent, cathartic, dry, sweet and hot, a dispellant of wind, fever, phlegm bile and melancholy, bitter and digestive.

It is one of the most common cathartics and has probably been in use all over India, from a very early date. The usual method of administration, is to rub down, about a dram of the root or stem with water and add to it some rock salt and ginger or sugar and black pepper. It is particularly beneficial in rheumatic and paralytic affections. Combined with chebulic myrobalans, it is useful in melancholia and dropsy.

TYLOPHORA FOLIA.

Official part.

The dried leaves of Tylophora asthmatica. Its odour is slightly aromatic ; it is almost devoid of taste.

Dose in powder ½ to 2 grains as an expectorant, 15 to 30 grains as an emetic.

Chemical Composition—A concentrated infusion of the leaves, has a slight acrid taste. Broughton of Ootacamond, obtained from a large quantity of leaves, a small amount of crystals, insufficient of analysis. Dissolved and injected into a small dog, it occasioned purging and vomitting. David Hooper, has shown, that the roots and leaves, contain an alkaloid, "Tylophorine" (*Pharmaceutical Journal, January 1891*). This is crystalline and forms a crystalline hydrochloride

Alkaloid "Tylophorine."

Emetic.

Physiological action—The roots and leaves, are one of the best indigenous substitute for ipecac. Their action is emetic, diaphoretic and expectorant and useful in all diseases, indicating the necessity of emesis. Dr.

G. Bidie considers, that it acts as a specific emetic, exciting vomitting after absorption, by its action on the vagus. (I. Pharmacopœa—page 459). They are also a remedy for dysentery, catarrh, and other affections in which ipecac, is generally employed.

In dyentery.

In pretty large doses, it acts as an emetic; in small doses, often repeated, as a cathartic.

Therapeutics—It has been used with great success in dysentery. *Roxburgh and Dr. Anderson of* Madras, used it with success, when dysentery happened to be epidemic in the camps and when the store of ipecac, was nearly wholly expended. Anislie states that it is expectorant and diaphoretic and often prescribed ½ teacupful of the infusion as an emetic for children, which suffer much from phlegm.

URGINEA.

Synonym—Indan Squill.

Official part.

The younger bulbs of Urginea Indica, taken soon after the plant has flowered. The taste is bitter and acrid. They should be kept in a dry place.

Chemical Composition—Contains bitter principles, similar to those found in ordinary squills, of which, it is an equivalent.

Preparation—

1. Acetum urginea—Dose 20 to 60 minims.
2. Pill : urginea composita--Dose 4 to 8 grains.

3. Oxymel urginea—Dose ½ to one fl. dram.
4. Syrup urginea—Dose ½ to one fl. dram.
5. Tinctura urginea—Dose 5 to 15 minims.

Expectorant and Diuretic.

Physiological action—It is a stimulant expectorant and diuretic. The bulb, when quite young and small not exceeding a lime in size, in doses of 10, 15, or 20 grains, acts as a diuretic, even more powerfully, than the official squill, but as it grows larger, it loses this property and becomes useless. The medicinal virtues, may vary with the season and locality of collection. The official squill, is known to be thus affected. The outer coats are quite inert.

It closely resembles digitalis in its action, but is a more powerful gastro-intestinal irritant; vomitting and purging result from even moderate doses, and after death, if animals are killed with it, much gastro-enteritis is found. As some of its constituents are excreted by the bronchial mucous membrane and in passing through it, irritate it, the secretions are thereby increased and so it is a powerful expectorant. In the course of its excretion, the kidneys are stimulated aud is therefore an energetic diuretic; but it often irritates the kidneys.

Therapeutics—It can be used similarly in all the cases, as the official squill; so it can be much used as an expectorant but as it irritates the bronchial muccus memberane, it is not advisable to administer it in acute bronchitis; nor should it be chosen in phthisis, lest it should cause dyspnœa; it is very valueable in chronic bronchitis, where the secretions are scanty.

In chronic Bronchitis.

As a diuretic, it should not be used in acute

Bright's disease, as it is too irritating to the kidneys ; it can only be used in chronic cases.

The Hakims employ this in paralytic affections ; also as an expectorant, digestive, diuretic, deobstruent and emmenagogue in many diseases, more especially in asthma, dropsy, rheumatism, calculous affections, leprosy and skin diseases.

VALERIANAE INDICAE RHIZOMA.

Inidian Valerian Rhizome.

The dried rhizome and rootlets of Valeriana Wallichii. Official part.

Chemical Comosition—contains volatile oil, valeric and organic acids, resin, tannin and wax It is an equeivalent of ordinary Valerian Rhizome.

Preparation—Tinctura Valerianæ Indicæ Ammoniata—Dose ½ to 1 fl dram.

Physiological Action—It is a stimulant and antispasmodic. Stimulant, antispasmodic

Therapeutics—It is to be administered suspended in mucilage with cinnamon water and is given as a carminative in cases of flatulence and as reflex stimulants in vomitting, palpitation &c. This also relieves neuralgia and is often prescribed for hysteria and other neurotic affections. In Hysteria.

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AND
PHARMACEUTICAL WORKS Ld.

ESTD. 1892.

Consulting Chemist and Analyst:
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The above works—the only *bona fide* indigenous industry of its kind in India—is now in the tenth year of its existence. The business has now entered on an altogether new phase of its career, as it has been fitted up with elaborate **steam power, vacuum pans, stills, centrifugal machine etc.**, of the latest approved pattern. It is confidently hoped that we are now in a position to compete with some of the best European Houses. Our Laboratory, with its Analytical Department, has also been largely improved and furnished with the requisite appliances. Every article is accurately standardised before being sent to the market. In addition to "our own **special preparations,**" we manufacture a great variety of Extracts, Tinctures, Salts, etc., strictly conformable to the Brit. Pharm. (1898) as also its Indian Addendum.

We specially draw attention of the Medical Profession to

the following standardised extracts and tinctures of the British Pharmacopœia 1898.

Of the Extracts—

1. **Ext. Belladonna Alcoholicum**—Contains 1 per cent. alkaloids of the Belladonna Root.

2. **Ext. Belladonna Liquidum.**—Contains ¾ grain of the alkaloids of Belladonna Root in 110 minium.

3. **Ext. Cinchonæ Liq.**—Contains 5 grains of the alkaloids of the Red Cinchona Bark in 110 minims.

4. **Ext. Ipecac Liq.**—Contains 2 to 2¼ grains of the alkaloids of Ipecac root in 110 minims.

5. **Ext. Nux Vomiça**—An extract containing 5 per cent. of Strychnine.

6. **Ext. Nux Vomica Liq.**—A liquid extract containing 1½ grains of Strychnine in 110 minims.

7. **Ext. Opii**—An extract containing 20 per cent. of morphia.

8. **Ext. Opii Liq.**—A liquid extract containing ¾ grains of morphia in 110 minims.

Of the tinctures—

1. **Tinctura Belladonna**—100 c.c. must contain ·048 to 0·052 gram of the total alkaloids.

2. **Tinctura Cinchona**—100 c.c. must contain ·95 to 1·05 gram of the alkaloids.

3. **Tinctura Cinchona Co.**—10 c.c. should yield ·045 to ·055 gram of the alkaloids.

4. **Tinctura Nux Vomica**—must contain ¼ grain in 110 minims; or 1 grain in one oz.

5. **Tinctura Opii**—100 c.c. must contain ·70 to ·80 gram of morphia.

A list of indigenous preparations which have not received official sanction.

EXT. ABROMA AUGUSTA LIQ.

(Liq. Extract of Ulat Kambal.)

A well tried medicine for painful **Dysmenorrhœa.** Thousands are cured by it.

Dr. Watt in his "Dictionary of Economic Products of India" records the opinion of thirteen medical men regarding the medical properties of the drug: of these, eight spoke favourably of it. Dr. R. Macleod says:—"It is a valuable medicine in Dysmenorrhœa...........I have seen it prove very efficacious in some cases especially in the congestive form of the disease" Dr. Thornton says:—"It is useful in the congestive and neuralgic varieties of Dysmenorrhœa. It regulates the menstrual flow and acts as an uterine tonic."

Dr. Evans says:—"The drug has never failed in my hand in speedily removing painful Dysmenorrhœa." (Pharmaco. Ind.)

4 Ounce phial As. 10, Dozen Rs. 6-12.

EXTRACTUM GULANCHA LIQ. CO.

1. *Tinospora Cordifolia.*
2. *Adhatoda Vasica.*
3. *Azadirachta Indica.*
4. *Chiretta.*
5. *Picrorhiza.*
6. *Chebulic myrobalans.*
7. *Oldenlandia Corymbosa.*

A well tried and reliable medicine for all sorts of **malarial fevers** (*quotidian, tertian* or *quartan*), whether accompanied or not by enlargement of the **Liver, Spleen Jaundice,** and **Spleen** soft and causes a diminution in their size. It ensures proper evacuation of the bowels, and improves appetite and digestion. It enriches the blood and thus removes **Dropsy, Anæmia.** It further gives flesh and strength to the patient. It has cured cases which were declared hopeless. It is made exclusively from indigenous plants and as it does not contain Quinine in any shape we recommend it especially to those who from idiosyncrasy or other causes can not take Quinine.

6 oz. phial—Re 1. Dozen—Rs. 11.

EXTRACT JAMBOLAN LIQ.

This preparation contains the active principles of the seeds of *Jambul fruits.* It has been used with remarkable success in cases of **Diabetes,** arresting as it does the diastatic conversion of starch into sugar. Dr. R. L. Dutta says, "In two of my cases of acute diabetes, it reduced the quantity of sugar and urine almost to the normal in a week."

4 Ounce phial Re. 1. Dozen Rs. 11.

EXTRACT KAMALA LIQ.

(Mallotus Philippinensis).

The well-known **Anthelmintic, Vermifuge and Purgative.** It is very efficient in the treatment of Tape-worms. It can be given without previous preparation of the patient. The worm is expelled dead at the third and fourth stool. If the first dose fails to operate on the bowels it may be repeated in four hours, or followed by a dose of castor-oil.

2 oz. phial As. 8. Dozen Rs. 5-4.

EXT. KHETPAPRAH LIQ.

(Oldenlandia Corymbosa.)

Highly efficacious in all forms of fevers specially **Bilious fevers,** and in **Jaundice.**

4 oz. phial As. 10. Dozon Rs. 6-12.

EXTRACTUM KURCHI LIQ. CO.

(Holarrhena Antidysenterica)

A specific without a rival for subacute and chronic Dysentery. It is equally efficacious in both the **bloody** and the **mucous** forms.

Many lives are carried off every year by this terrible disease in Lower Bengal. It is curable in the acute as well as in the chronic stage. But in the chronic form the intestinal glands in course of time become so far destroyed that absorption of a sufficient amount of food material becomes impossible. When this stage is reached no medicine can effect a cure, for it is well known that glandular structures once destroyed can not be replaced. We therefore request that a fair trial be given to our Preparation before it is too late.

4 oz. phial Rs. 1-4. Dozen Rs. 13-8.

EXTRACTUM PUNARNAVÆ LIQ.

(Liquid Extract of Punarnava.)

Punarnava (*Boerhaavia Disffusa*) is an excellent **diuretic, stomachic** and **laxative.** It is, as its synonym *Shothaghni* (killer of dropsy) implies, the sovereign remedy for **dropsy** and may be used in all its various forms whether the kidneys be healthy or diseased. It also yields gratifying results in **Jaundice** in which it rapidly eliminates bile poisons in the blood by causing diuresis. It has been very successfully used as a diuretic in **Cholera.**

Although Punarnava is *Boerhaavia Diffusa*, the plant universally used by our *Kavirajes* as শ্বেত পুনর্ণবা is different. A sample was submitted by Dr. P. C. Ray to the authorities at the Royal Botanical Gardens, Sibpore, for examination and it was identified as *Trianthema Monogyna* (nat. ord. Ficoideœ). Dr. Ray on chemical analysis of the juice of the succulent stems finds it to consist of a large proportion of Sodium chloride and Potassium nitrate. The cooling and diuretic properties of the plant are thus easily explained.

4 oz. phial As. 10. Doz. Rs. 6-12.

EXT. SARACA INDICA LIQ.

(*Liquid Extract of Asoka.*)

Highly efficacious in female diseases. It cures **Leucorrhœa, Menorrhagia** and other **Diseases of the uterus.**

The bark was much used by the physician Chakradatta in uterine affections and especially in Menorrhagia.

4 Ounce phial As. 10. Dozen Rs. 6-12.

EXT. WITHANIA SOMNIFERA LIQ.

(*Liquid Extract of Aswagandha.*)

The well-known Ayurvedic tonic. **It infuses vigour in the worn out system and cures premature decrepitude.**

It is described in the Nighantas as tonic and alterative and is recommended in *rheumatism*, *cough*, *dropsy*, *consumption* and *senile debility*.

4 Ounce phial As. 12. Dozen Rs. 8-4.

ELIXIR PAPAIN.

(*Carica Papya*)

This vegetable pepsin in a soluble form is highly efficacious in **Dyspepsia, Gastralgia, Chronic Stomachic Catarrh** as also in **gastric pain** occurring shortly after eating.

Therapeutical notes :—Papain is the active principle of *Papya juice* ; it is now an article of commerce in Europe for medical purposes and is said to be capable of digesting 200 times its weight of fibrin ; it has been used as a solvent of diphtheritic false membrane.

Dr. George Herschell (Brit. Medical Journal, 1886) records, "it relieves the aggravating symptoms of Dyspepsia such as loss of appetite and sleep, irritability, headache, which so much affect the children. Dr. Herschell believes that the remedy acts in dissolving the mucus, which accumulates in unusual quantity upon the stomach and intestines and prevents the absorption of food. In the acid dyspepsia of adults when heart-burn and flatulence are the chief indications of impaired digestion he finds *papain* as a valuable remedy." (Pharmaco. Ind.)

4 ounce phial Re. 1 ; Dozen Rs. 11

IMPERIAL